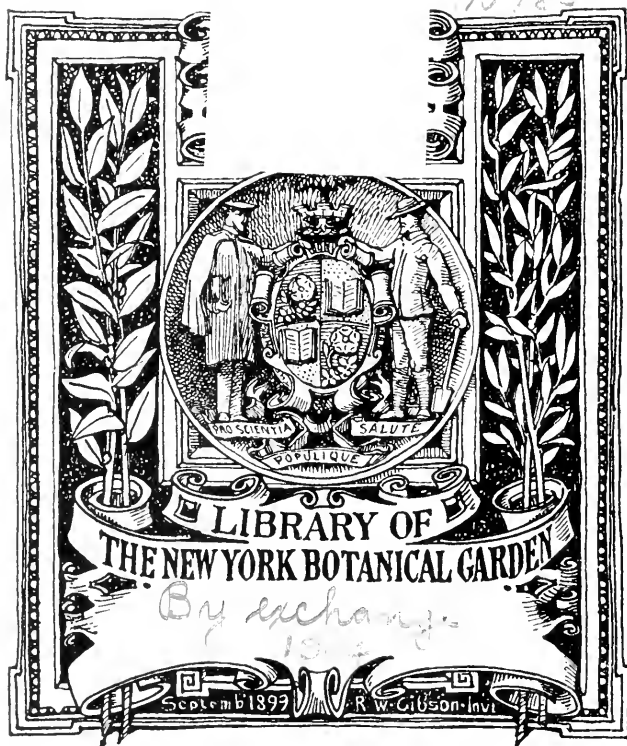
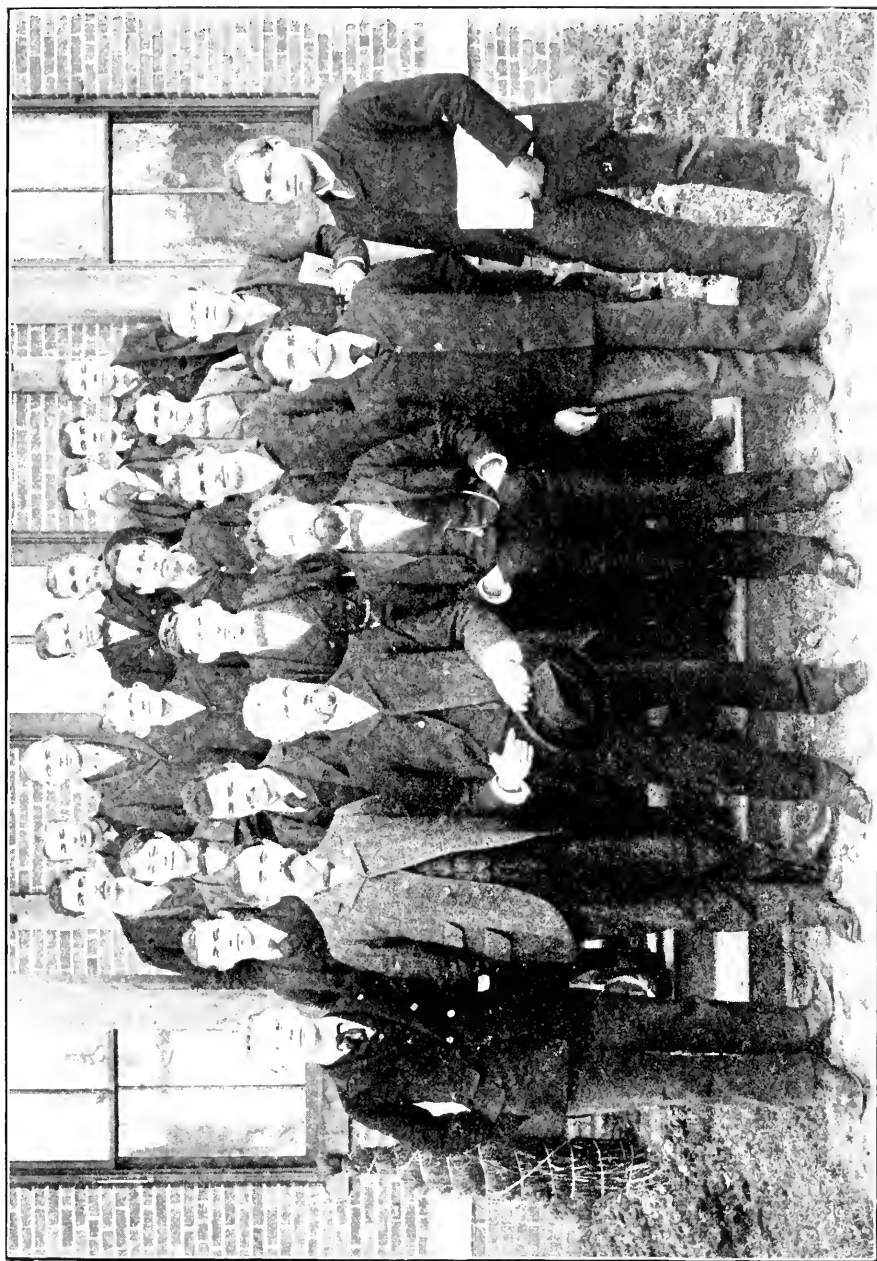


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CLASS IN ORCHARDING AND SMALL FRUITS AT THE AGRICULTURAL COLLEGE.

FORTIETH ANNUAL REPORT

OF THE

STATE HORTICULTURAL SOCIETY OF MISSOURI.

MEETINGS AT

Springfield, June 8, 9, 10, and Moberly, Dec. 7, 8, 9, 1897.

L. A. GOODMAN, Secretary,

WESTPORT, MO.



JEFFERSON CITY, MO. :

TRIBUNE PRINTING COMPANY, STATE PRINTERS AND BINDERS,

1898.

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1898

Missouri State Horticultural Society.

To His Excellency, LON V. STEPHENS, Governor:

This report of our Society work, of the meetings held, of the moneys expended and of the local societies and counties reporting for the year 1897 is respectfully submitted.

L. A. GOODMAN, Secretary,
Westport, Mo.

To the Commissioners of Public Printing:

CITY OF JEFFERSON, December 19, 1897.

I require for the use of my office 4,000 copies of Missouri Horticultural report—2,000 bound in cloth and 2,000 in paper—which I desire printed as per accompanying sample.

Respectfully,

L. A. GOODMAN, Secretary,
Westport, Mo.

Approved:

A. A. LESUEUR, Secretary of State.

J. M. SEIBERT, State Auditor.

J. L. PITTS, State Treasurer.

Officers for the Year 1897.

Governor LON V. STEPHENS.....	Ex-Officio Member of Executive Committee
J. C. EVANS, President.....	North Kansas City
N. F. MURRAY, Vice-President.....	Oregon
SAMUEL MILLER, Second Vice-President.....	Bluffton
L. A. GOODMAN, Secretary.....	Westport
A. NELSON, Treasurer.....	Lebanon

List of Honorary Members.

R. H. JESSE, President State University.....	Columbia
Hon. A. A. LESUEUR, Secretary of State.....	Jefferson City
MISS M. E. MURTFELDT.....	Kirkwood
GEORGE HUSSMAN.....	Napa, Cal.
T. T. LYON.....	South Haven, Mich.
C. W. MURTFELDT.....	Kirkwood
Hon. N. J. COLMAN.....	St. Louis
SAMUEL MILLER.....	Bluffton
Prof. M. G. KERN.....	St. Louis
Prof. B. T. BUSH.....	Independence
Prof. B. T. GALLOWAY.....	Washington, D. C.
CONRAD HARTZELL.....	St. Joseph

List of Life Members.

WM. MUIR, old member.....	Fox Creek
H. CLAGGETT, old member.....	Kansas City
J. C. EVANS.....	North Kansas City
L. A. GOODMAN.....	Westport
D. M. DUNLAP.....	Fulton
D. A. ROBBETT.....	Columbia
CHAS. HEBER.....	Seneca
C. H. EVANS.....	St. Louis
W. R. WILKINSON.....	Altenburg
H. M. WHITNER.....	Fredericktown

Standing Committees.

Orchards.

J. A. DUKES, Weston. D. A. ROBNETT, Columbla. W. H. PARK, Springfield.

Vineyards.

JACOB ROMMEL, Morrison. F. McCANN, St. Joseph. J. T. SNODGRASS, West Plains.

Small Fruits.

G. W. HOPKINS, Springfield. J. N. MENIFEE, Oregon. HENRY SCHNELL, Glasgow.

Stone Fruits.

S. W. GILBERT, Thayer. Z. T. RUSSELL, Carthage. ARTHUR PATTERSON, Kirksville.

Vegetables.

C. M. WILLIAMS, Marcelline. J. AMBS, Columbla. W. E. LILLY, Chillicothe.

Flowers.

E. H. MICHEL, St. Louis. Mrs. G. E. DUGAN, Sedalla. C. I. ROBARDS, Butler.

Ornamentals.

GEO. E. KESSLER, Kansas City. Prof. H. C. IRISH, St. Louis. R. E. BAILEY, Fulton.

Entomology.

Miss M. E. MURTFELDT, Kirkwood. Prof. J. M. STEDMAN, Columbla.

Botany.

Prof. G. C. BROADHEAD, Columbla. G. A. ATWOOD, Springfield.
B. F. BUSH, Independence.

Nomenclature.

W. G. GANO, Parkville. E. L. POLLARD, Olden. J. H. LOGAN, Nevada.

New Fruits.

SAMUEL MILLER, Bluffton. J. F. WILCOX, St. Joseph. A. H. GILKESON, Warrensburg.

Ornithology.

O. WIDMAN, Old Orchard. C. W. MURTFELDT, Kirkwood. C. HOWARD, Willow Springs.

Injurious Fungi.

Prof. J. C. WHITTEN, Columbla. Prof. W. TRELEASE, St. Louis.

Packing and Marketing Fruits.

E. T. HOLLISTER, St. Louis. H. E. MOSELY, Olden. HENRY ADKINS, Sarcoxie.

Transportation.

J. M. RICE, Sarcoxie, C. C. BELL, Boonville. L. A. GOODMAN, Westport.

Horticultural Education.

Chairman, G. B. LAMM, Sedalla. L. A. GOODMAN, Westport. Prof. J. C. WHITTEN, Columbla.
Mrs. G. E. DUGAN, Sedalla. Miss M. E. MURTFELDT, Kirkwood.
Prof. W. TRELEASE, St. Louis. Prof. J. R. KIRK, Jefferson City.

Missouri State Horticultural Society, Organized January 5,
1859, at Jefferson City.

INCORPORATION AND REORGANIZATION OF THE HORTICULTURAL
SOCIETY BY AN ACT OF THE GENERAL ASSEMBLY IN 1893.

The following law was passed by the last Legislature incorporating the State Horticultural Society. The Executive Committee met soon after the passage of this act and accepted its provisions, and at the semi-annual meeting of the Society at Columbia, June 6, 7, 8, 1893, the act was adopted as part of the constitution of the Society.

MEMBERSHIP.

Under the new constitution the law requires the payment of \$1 per year for membership fee. We hope that we shall have a good long list of members under our plan for business. The plan under which we have been working, of giving each local society the privilege of paying their fee into their local society, thus making them a member of the State Society, cannot now avail. Each person must become a member of the State Society and keep up his membership each year.

We should like to see a good number of life members also. Life membership, \$10.

L. A. GOODMAN, Secretary.

ACT OF THE GENERAL ASSEMBLY.

The Missouri State Horticultural Society is hereby instituted and created a body corporate, to be named and styled as above, and shall have perpetual succession, power to sue and be sued, complain and defend in all courts, and to make and use a common seal and alter the same at pleasure.

The Missouri State Horticultural Society shall be composed of such persons as take an interest in the advancement of horticulture in this State, who shall apply for membership and pay into the Society treasury the sum of one dollar per year, or ten dollars for a life membership, the basis for organization to be the Missouri State Horticultural Society, as now known and existing, and whose expenses have been borne and annual reports paid for by appropriations from the State treasury. The business of the Society, so far as it relates to transactions with the State, shall be conducted by an Executive Board, to be composed of the President, Vice-President, Second Vice-President, Secretary and Treasurer, who shall be elected by ballot at an annual meeting of the Society. The Governor of the State shall be ex officio a member of the Board—all other business of the Society to be conducted as its by-laws may direct. All appropriations made by the State for the aid of the Society shall be expended by means of requisitions to be made by order of the Board on the State Auditor, signed by the President and Secretary and attested with the seal; and the Treasurer shall annually publish a detailed statement of the expenditures of the Board,

covering all moneys received by it. The Public Printer shall annually, under the direction of the Board, print such number of the reports of the proceedings of the Board, Society and auxiliary societies as may, in the judgment of the State Printing Commission, be justified by the appropriation made for that purpose by the General Assembly, such annual report not to contain more than 400 pages. The Secretary of the Society shall receive a salary of eight hundred dollars per annum as full compensation for his services; all other officers shall serve without compensation, except that they may receive their actual expenses in attending meetings of the Board.

Constitution.

ARTICLE I. This association shall be known as the Missouri State Horticultural Society. Its object shall be the promotion of horticulture in all its branches.

ART. II. Any person may become a member of this Society upon the payment of one dollar, and membership shall continue upon the payment of one dollar annually. The payment of ten dollars at any one time shall constitute a person a life member, and honorary members may be elected at any regular meeting of the Society. And any lady may become a member by giving her name to the Secretary.

ART. III. The officers of this Society shall consist of a President, Vice-President, Second Vice-President, a Secretary and a Treasurer, who shall be elected by ballot at each regular annual meeting, and whose term of office shall begin on the first day of June following their election.

ART. IV. The elective officers of this Society shall constitute an Executive Committee, at any meeting of which a majority of the members shall have power to transact business. The other duties of the officers shall be such as usually pertain to the same officers in similar organizations.

ART. V. The regular meetings of this Society shall be held annually on the first Tuesdays in December and June, except when otherwise ordered by the Executive Committee. Special meetings of the Society may be called by the Executive Committee, and meetings of the committee by the President and Secretary.

ART. VI. As soon after each regular annual meeting as possible, the president shall appoint the following standing committees, and they shall be required to give a report, in writing, under their respective heads, at the annual and semi-annual meetings of the Society, of what transpires during the year of interest to the society: Orchards, Vineyards, Stone-Fruits, Small Fruits, Vegetables, Flowers, Ornamentals, Entomology, Ornithology, Botany, Nomenclature, New Fruits, Injurious Fungi, Packing and Marketing Fruit and Transportation.

ART. VII. The Treasurer shall give a bond in twice the sum he is expected to handle, executed in trust to the President of this Society (forfeiture to be made to the Society), with two or more sureties, qualifying before a notary public, of their qualifications as bondsmen, as is provided by the statute concerning securities.

ART. VIII. This constitution may be amended by a two-thirds vote of the members present at any regular meeting.

How to Organize a Horticultural Society, also the Constitution for a Local Organization.

Anyone much interested on this subject of Horticulture can organize a society if he will speak to five or six different persons who are known to be prominent in this matter. Tell them that there ought to be a society in your county, and as it is such a good fruit country, ask them if they do not want to help organize one. You will hardly meet a refusal, but will be met with the remark "that they do not believe there is interest enough in your county to keep one up." Never mind this, but make an appointment to meet in some office in town on some Saturday. If you can get five to come together, organize and elect officers. Make the meetings regular each month and on the same Saturday. Some lawyer will let you have the use of his room to hold the meetings. Have the meeting in the best town in the county even if you have to go some distance to meet there. Talk this up until the next meeting, and let each one promise to bring another. Do not expect to have everyone belong, for they will not. Hold six winter meetings (November to April) in the city or village, and at the March or April meeting, select the places to hold the six summer meetings (May to October) at the homes of the members. Make this a picnic dinner, meeting about 10 o'clock, and after the dinner, hold the meeting and discussion; offer a few premiums for fruits and flowers, and have a general good time. Do not be afraid of a dollar or two, but use as much judgment in this matter as you would in any business of your own, and you will succeed. Talk to your neighbors about it if they are interested in fruit-growing, if not, choose those who are so interested. They will not be much help to you if they are not fruit-growers. Make out a programme for the year, choosing one or two for an essay at each meeting. When the reports of the standing committees are made, have it done in writing, and have a report at every meeting. You cannot expect to have everything work in complete order at first, and do not get discouraged if you find trouble in the start. Take your

wives with you and make a good social time also. If I can be of use to you at any time, I will come and visit you if it is possible for me to get away. I will try and bring someone with me also to help along the good work.

L. A. GOODMAN,
State Secretary.

Constitution.

ARTICLE I. This association shall be known as the — Horticultural Society.

ART. II. All persons interested in the subject of Horticulture may become members of this Society by signing the Constitution and paying annually to the Treasurer the sum of one dollar: And provided further, That any person paying at one time the sum of ten dollars to the Treasurer, may become a life member, and thereafter exempt from annual dues: Provided further, That all ladies may become members by signing the Constitution without the payment of one dollar.

ART. III. SECTION 1. The officers of this Society shall consist of a President, Vice-President, Secretary, Treasurer and Executive Committee, consisting of five, of which the President and Vice-President shall be ex officio members.

SEC. 2. The President shall exercise a general superintendence of the affairs of the Society; preside at all meeting of the Society; appoint all committees unless otherwise provided; draw all orders on the Treasurer as directed by the Society; call special meetings of the Society or Executive Committee when deemed necessary; he shall be ex officio President of the Executive Committee.

SEC. 3. The Vice-President shall assist the President, and in his absence, perform his duties, and be ex officio a member of the Executive Committee.

SEC. 4. The Treasurer shall receive all moneys belonging to the Society; shall keep a just and true account of the same, from what source received, and pay out the same upon the order of the President, countersigned by the Secretary. At the meeting of the Society on the — Saturday in December in each year (or oftener, if required by the Executive Committee), he shall make a full and complete report of all receipts and disbursements, and at the expiration of his term of office, turn over all books, papers, and all money or other property belonging to the Society, to his successor in office. The

Treasurer, before entering on the discharge of the duties of his office, shall enter into a bond with sufficient security, to be approved by the President of the Society for its use, in the sum of ———, conditioned for the faithful performance of the duties required of him in this section.

SEC. 5. The Secretary shall keep a full and complete minute of each meeting of the Society, and the proceedings of the Executive Committee. He shall receive and safely keep all books, periodicals, stationery, seeds, fruits and other like property of the Society subject to its order; shall correspond as may be necessary with all persons or societies as the welfare of the Society may demand. He shall report all the proceedings of the Executive Committee to the Society at its first meeting thereafter. He shall countersign all orders drawn upon the Treasurer by the President under the direction of the Society, and have the care and custody of the seal of the Society.

SEC. 6. The Executive Committee shall assist and advise the officers in the discharge of their duties; prepare all premium lists; make all necessary arrangements for holding and conducting any and all such fairs as the Society may determine to hold, and such exhibitions of fruit as the Society may determine to make, and exercise a general supervision over the same, and generally to provide for the arrangements and business of the Society.

ART. IV. The officers of this Society shall be elected by ballot from among its members for the term of one year. The annual election shall be held at the regular meeting of the Society on the ——— Saturday in December, where the general business of the Society shall be transacted. Vacancies may be filled at any regular meeting of the Society.

ART. V. The regular meeting of this Society shall be held on the ——— Saturday of each month, at 1 o'clock p. m., at such places as the Society may select, at ———: Provided, that the meetings in the months of May, June, July, August, September and October of each year may, by a vote of the Society, be held at the residence of any of the members outside of the city.

ART. VI. Executive Committee may provide: First, for the payment of premiums to members of the Society for the best display of fruit, flowers or vegetables made at any regular meeting of the Society; second, for essays on any subject of interest to the Society, and arrangement of programme for the year; third, and for determining the places for each meeting of the Society for the months of May to October, inclusive.

ART. VII. Five members of the Society shall constitute a quorum at any meeting, and three members of the Executive Committee shall

be authorized to transact business at any meeting of the committee duly called. Special meetings of the Society or Executive Committee may be held by order of the President or any three of the committee on one week's notice to all members of the Society or Board (as the case may be), given personally, or through the postoffice. Adjourned meetings may be held from time to time, as the Society may determine.

ART. VIII. The funds of this Society shall not be appropriated to any purpose without a vote of a majority of the members present at any regular meeting of the Society.

ART. IX. This Society shall have the following standing committees, which shall be appointed by the President at the January meeting in each year: Small Fruits, Stone Fruits, Orchards, Vineyards, Vegetables, Flowers, Ornamentals, Entymology, Botany, to each of which shall be referred all matters relating to those particular subjects. Each of said committees shall consist of one to three members.

ART. X. This Constitution may be amended by a two-thirds vote of all the members of the Society at any regular meeting: Provided, that notice of the intencioned amendment shall have been given at least one month prior to any action taken thereon.

ART. XI. The meetings of this Society shall be governed by the parliamentary rules usual for deliberative bodies.

List of County Societies.

Adair County Horticultural Society—

R. M. Brasher, Pres't, Kirksville.
A. Patterson, Sec'y, Kirksville.

Atchison County Horticultural Society—

C. W. Coe, Pres't, Tarkio.
R. Lynn, Sec'y, Tarkio.

Audrain County Horticultural Society—

M. B. Guthrie, Pres't., Mexico.
K. B. Wilkerson, Vice-Pres't, Mexico.
R. A. Ramsay, sec'y, Mexico.
W. G. Hutton, Ass't Sec'y, Mexico.
Wm. Eagan, Ass't Sec'y, Mexico.
W. M. Pearson, Treas., Mexico.

Barry County Horticultural Association—

W. W. Witt, Pres't, Exeter.
G. G. James, Sec'y, Exeter.
J. C. Crane, Treas., Exeter.

Barton County Horticultural Society—

C. Fink, Pres't, Lamar.
B. D. Hayes, Sec'y, Lamar.

Bates County Horticultural Society—

C. I. Robards, Pres't, Butler.
Henry Speer, Sec'y, Butler.

Birch Tree Fruit Growers' Ass'n, Shannon County—

Jas. Kirkendal, Pres't, Birch Tree.
F. Anderson, Sec'y, Birch Tree.

Boone County Horticultural Society—

D. A. Robnett, Pres't, Columbia.
Jos. Baumgarner, Sec'y, Columbia.
G. W. Bourroughs, Treas., Columbia.

Buchanan County Horticultural Society—

J. H. Karnes, Pres't, St. Joseph.
F. McCoun, Sec'y, St. Joseph.

Butler County Horticultural Society—

D. C. Kitteridge, Pres't, Poplar Bluff.
E. R. Lentz, Sec'y, Poplar Bluff.

Butterfield Local—Barry County—

E. B. Utter, Pres't, Butterfield.
J. E. Utter, Sec'y, Butterfield.

Benton County, Ark. Horticultural Society—

C. J. Eld, Pres't, Bentonville.
J. C. Rucker, Vice-Pres't, Bentonville.
I. B. Lawton, Sec'y, Bentonville.
N. B. Cotton, Treas., Bentonville.

Callaway County Horticultural Society—

R. T. Murphy, Pres't, New Bloomfield.
R. E. Bailey, Sec'y, Fulton.

Camden County Horticultural Society—

J. W. Burnhans, Pres't, Stoutland.
J. C. Evans, Sec'y, Stoutland.

Central Missouri Horticultural Association—

David Edwards, Pres't, Boonville.
F. J. Boller, 1st V. Pres't, Boonville.
Mrs. John Durr, 2nd V. Pres't, Boonville.
C. C. Bell, Sec'y, Boonville.
W. A. Smiley, Treas., Boonville.

Christian County Horticultural Society—

M. King, Pres't, Billings.
R. C. Hendricks, Sec'y, Billings.

Clay County Horticultural Society—

F. M. Williams, Pres't, Barry.
Oliver Chedister, Sec'y, Linden.

Cole County Horticultural Society—

J. B. Brooks, Pres't, Jefferson City.
T. M. Barker, V. Pres't, Centertown.
A. J. Davis, Sec'y, Jefferson City.
F. M. Brown, Treas., Jefferson City.

Conway Hort. Society, Laclede County—

W. H. Getty, Pres't, Conway.
R. O. Hardy, Rec. Sec'y, Conway.

Gentry County Horticultural Society—

W. A. Garrett, Pres't, Albany.
G. E. Adams, Sec'y, Albany.
Wm. David, Treas., Albany.

Goodman Hort. Society, McDonald County—

E. H. Gurney, Treas., Goodman.

Greene County Horticultural Society—

W. T. Zink, Pres't, Springfield.
A. W. Howell, V. Pres't, Springfield.
G. A. Atwood, Sec'y, Springfield.
H. H. Park, Treas., Springfield.

Henry County Horticultural Society—

M. L. Bonham, Pres't, Clinton.
H. C. Green, V. Pres't, Clinton.
J. M. Pretzinger, Sec'y, Clinton.
H. F. Burris, Treas., Clinton.

Holt County Horticultural Society—

N. F. Murray, Pres't, Oregon.
J. N. Menfee, V. Pres't, Oregon.
S. Blanchard, Sec'y and Treas., Oregon
(32 members.)

Jasper County Horticultural Society—

S. S. Riley, Pres't, Carthage.
Z. T. Russell, Sec'y, Carthage.

COUNTY SOCIETIES—Continued.

- Koshkonong Hort. Society, Oregon County—
T. M. Culver, Pres't, Koshkonong.
C. M. Alderson, Sec'y, Koshkonong.
H. C. Huxley, Treas., Thayer.
- Laclede County Horticultural Society—
A. Nelson, Pres't, Lebanon.
C. L. Palmer, Sec'y, Lebanon.
D. R. Dillenderfer, Treas., Lebanon.
- Lafayette County Horticultural Society—
H. Turlenkle, Pres't, Alma.
G. H. Robbins, Sec'y, Mayview.
- Lawrence County Horticultural Society—
W. T. Seaward, Pres't, Marionville.
B. Logan, Sec'y, Marionville.
J. B. Logan, Treas., Marionville.
- Linn County Horticultural Society—
A. P. Swan, Pres't, Marcelline.
H. D. Porter, V. Pres't, Marcelline.
Hiram Long, Sec'y, Marcelline.
I. W. Porter, Treas., Marcelline.
- Livingston Horticultural Society—
G. A. Smith, Pres't, Chillicothe.
J. T. Jackson, Sec'y, Chillicothe.
- Madison County Horticultural Society—
A. A. Blumer, Pres't, Fredericktown.
H. M. Whitener, Sec'y, Fredericktown.
- Meramec Hort. Ass'n, Crawford County—
E. R. Bowen, Pres't, Steelville.
Peter Lovengood, V. Pres't, Steelville.
Jos. Marsh, Sec'y, Steelville.
K. D. Norval, Ass't Sec'y, Steelville.
Chas. Lay, Treas., Steelville.
- Mercer County Horticultural Society—
H. R. Wayman, Pres't, Alvord.
J. A. Kennedy, Sec'y, Ravanna.
- Miller County Horticultural Society—
John Vetter, Pres't, Eldon.
E. M. Sumptain, V. Pres't, Spring Garden.
N. J. Shepherd, Sec'y, Eldon.
J. R. Helfrich, Treas., Eldon.
- Missouri-Arkansas Horticultural Society—
C. Barnard, Pres't, Thayer, Mo.
P. P. B. Hynson, Sec'y, Mammoth Springs, Arkansas.
- Missouri Valley Horticultural Society—
Homer Reed, Pres't, Kansas City.
Edwin Taylor, V. Pres't, Kansas City.
C. A. Chandler, Sec'y, Argentine, Kas.
G. F. Espenlaub, Treas., Rosedale, Kas.
- Monett Local—Barry County—
R. D. Creed, Pres't, Monett.
Geo. Raupp, Sec'y, Monett.
- Montgomery County Horticultural Society—
F. Gutman, Pres't, Hugo.
C. Hausser, Sec'y, Hugo.
- Mound City Horticultural Society—
D. B. Browning, Pres't, Mound City.
J. M. Harness, Sec'y, Mound City.
- Neosho Fruit Growers and Shippers Association (Newton Co.)—
T. P. Price, Pres't, Neosho.
R. P. Liles, V. Pres't, Neosho.
F. H. Speakman, Sec'y, Neosho.
Scott Ferris, Treas., Neosho.
- Norwood Horticultural Society—
J. W. Hollenbeck, Pres't, Norwood.
W. S. Callhoun, Sec'y, Norwood.
- Pettis County Fruit and Dairy Club—
Ed. Brown, Pres't, Sedalia.
G. B. Lamm, Sec'y, Sedalia.
J. H. Monsees, Treas., Beamon.
- Phelps County Horticultural Society—
Robert Merriwether, Pres't, Rolla.
W. W. Southgate, Sec'y, Rolla.
- Peirce City Fruit Growers Association, Lawrence County—
E. L. Parker, Pres't, Peirce City.
J. G. Wells, V. Pres't, Peirce City.
R. H. Edwards, Sec'y, Peirce City.
J. B. Jones, Treas., Peirce City.
- Polk County Horticultural and Agr. Ass'n—
G. W. Williams, Pres't, Humansville.
C. M. Briggs, Sec'y, Humansville.
A. H. Schofield, Treas., Humansville.
- Polk County (Ark.) Horticultural Society—
A. W. St. John, Pres't, Mena, Ark.
D. H. Hopkins, V. Pres't, Dallas, Ark.
F. S. Foster, Sec'y, Mena, Ark.
G. S. Graham, Treas., Dallas, Ark.
- Republic Hort. Society, Greene County—
W. O. Wade, Pres't, Republic.
W. E. Goodwin, V. Pres't, Republic.
T. B. Wallace, Sec'y and Treas., Republic.
- Ripley County Horticultural Society—
J. G. Hancock, Pres't, Doniphan.
S. S. Hancock, Sec'y, Doniphan.
- St. Francois County Horticultural Society—
R. C. Tucker, Pres't, Farmington.
W. F. Hoey, Sec'y, Farmington.
- Saline County Horticultural Society—
J. T. Stewart, Pres't, Blackburn.
Thos. Adams, Sec'y, Marshall.
- Sarcoxis Horticultural Association—
W. T. Barkholder, Pres't, Sarcoxie.
John Johnson, V. Pres't, Sarcoxie.
J. B. Wild, Sec'y, Sarcoxie.
H. B. Boyd, Treas., Sarcoxie.
J. W. Haggard, Manager, Sarcoxie.
- Seligman Local—Barry County—
G. W. Roler, Pres't, Seligman.
H. M. Foster, Sec'y, Seligman.
- Shannon County Horticultural Society—
C. W. Cochran, Pres't, Monteer.
G. F. Adams, Sec'y, Monteer.
- South Mo. Fruit Growers Ass'n, Howell Co.—
Geo. Comley, Pres't, Willow Springs.
Mr. Lovewell, Sec'y, Willow Springs.

COUNTY SOCIETIES—Continued

South Mo. Hort. Ass'n, Howell County—

D. J. Nichols, Pres't, West Plains.
 J. W. Hilt, V. Pres't, West Plains.
 J. T. Snodgrass, Sec'y and Treas., W. Plains

Tri-County Horticultural Society—

J. H. Holloway, Pres't, Richland.
 S. Kellar, Sec'y, Richland.

Union Horticultural Society—

E. S. Link, Pres't, Jefferson City.
 D. A. Robnett, V. Pres't, Columbia.
 A. J. Davis, Sec'y, Jefferson City.

Vernon County Fruit Growers Association—

J. D. Bowman, Pres't, Nevada.
 J. Kennedy, V. Pres't, Nevada.
 W. H. Litson, Jr., Sec'y, Nevada.
 W. B. Smith, Treas., Nevada.

Washburn Local—Barry County—

H. J. Wood, Pres't, Washburn.
 G. K. Hurd, V. Pres't, Washburn.
 J. D. Berryhill, Sec'y, Washburn.
 J. J. Hickman, Treas., Washburn.

Wayne County Horticultural Society—

W. C. Mulherin, Pres't, Chaonia.
 John Ware, Sec'y, Wappapello.
 Jacob Fry, Treas., Wappapello

Wright County Horticultural Society—

G. S. Killam, Pres't, Mt. Grove.
 B. S. Snyder, V. Pres't, Mt. Grove.
 J. A. Clay, V. Pres't, Mt. Grove.
 J. P. Cawdln, V. Pres't, Mt. Grove.
 Mrs. A. Z. Moore, Sec'y, Mt. Grove.
 Mrs. C. Brooker, Treas., Mt. Grove.

SUMMER MEETING.

Held at Springfield, June 8, 9 and 10, 1897.

STATE HORTICULTURAL MEETING.

It was promised on the part of Springfield that she would do her part to make the summer meeting of the State Horticultural Society a success if the officers would give her the convention. The Southwest is of the opinion that the contract was fulfilled to the full satisfaction of all participating in the the very profitable and delightful sessions. The attendance was good and the spirit was admirable.

President Evans, as full of vigor as ever, was promptly on hand, and so were Secretary Goodman, Vice-Presidents N. F. Murray and Samuel Miller, and Treasurer Nelson.

Springfield's two horticultural societies were well represented and there were many visitors from out of the county, but not so many as was hoped, for fruit-growers enjoy "getting together" as well as any other class of citizens. So those who were "not there" were missed.

Secretary Goodman had everything in readiness to move when the president called the meeting to order the evening of the first day, June 8th.—The Southwest.

On Tuesday, June 8, at 8 p. m., the semi-annual meeting of the Missouri State Horticultural Society was called to order by President J. C. Evans.

The opening prayer was made by Dr. Boude.

Mayor Bartlett, of Springfield, presented the address of welcome.

ADDRESS OF WELCOME.

Mr. President, Ladies and Gentlemen—From time immemorial, in all civilized nations, husbandry has held a high and honored place; today it is recognized as the highest and most important of all avocations of peace.

While we pride ourselves on the diversity of our pursuits and their mutual helpfulness to each other, yet it is universally acknowledged that horticulture and its kindred branches are the reliance and support of all the rest. The politician who would carry favor poses as the friend of the farmer, and the protest of millions of voices from every section of the United States would be instantly heard were legislation hurtful to his interests attempted.

The value of organized effort and the mutual helpfulness gained by social intercourse are coming to be recognized more each year, and it is for this I have the pleasure of welcoming you to our midst today.

Missouri stands at the head of her sister states and even leads the world in some of her productions, and by your efforts she will soon take the lead in her yearly yield of fruits and vegetables. With pardonable pride we speak of the strawberry output of the Sarcoux region and the Olden Fruit Farm, realizing they are but the beginning of the development of our wonderful resources along that line. But to return to you, our guests, I am glad to see so many ladies among you. Ever since Eve began her investigations with the forbidden fruit her daughters have followed in her footsteps, and brought the men along, too, just as Adam was anxious to share when there was something good to eat. Floriculture is *hers* by an inborn right, and the Greeks crowned Ceres—a woman—goddess of the harvest grains.

God ordained the Feast of the Harvest for his ancient people, and we do well to remember it to-day. Freely we offer you the hospitality of the city and its people. We are glad to have the pleasure of your presence in our midst.

The response by Vice-President N. F. Murray followed.

RESPONSE.

Mr. President, Ladies and Gentlemen—In response to the eloquent address of welcome by your worthy mayor, we desire to thank you for the warm and generous reception and hearty welcome you have given us to the beautiful “Queen City of the Southwest,” and to the hospitality of your homes.

Quite a number of us have been in your city on former occasions, but are glad to come again, knowing quite well from our past experience that we will be royally entertained by the ever wide-awake, progressive citizens of Springfield.

We are thankful to the Greene County Horticultural Society for the invitation to meet with you at this time, and we congratulate your good people of Springfield and of Greene county that you have a strong local society doing such earnest, noble work to develop the fruit industry in your midst.

Every city of any considerable size, in order to grow and prosper, must have one or more leading industries to give employment to its laborers. Located as you are, on the summit of the Ozarks, where you have the pure mountain air, free from malaria, surrounded with mammoth springs of pure crystal water, from which your city takes its name, with a rich soil full of iron and other minerals, which seems to have been especially endowed by the Creator for growing the best of everything, with a city of 60,000 inhabitants, justly entitled to the beautiful name you have won, "Queen City of the Southwest," where you have the best of schools, colleges, churches and all the modern improvements of a great city, in the center of a great fruit section, where you have the best of orchards, vineyards and berry plantations, and that which it takes to comprehend and make the best of all these things, the most intelligent, energetic and best of people; with all of these I am not at all surprised at the story I heard of an occurrence which took place some time ago at one of your camp meetings in South Missouri. At the close of an earnest appeal by the good parson to his congregation to change their way of living, he took an old gentleman by the hand and said: "Come, now, my brother, don't you want to make a start for heaven tonight?" The old man replied: "No! No! No, sir!" "And why not, my dear brother? Why not?" "Oh, well, parson, I tell you what it is: South Missouri, the land of the big red apple, strawberries and cream, is plenty good enough for me yet awhile." On one of my former trips to your city I was kindly taken in charge of by two of your worthy citizens for a trip to Percy cave, which we found not so large, but more beautiful, than the Mammoth cave of Kentucky. On our way out I noticed that all kinds of fruit trees, grain, grass and vegetables grew luxuriantly right among the surface rocks, the larger ones having been utilized in building stone fences. But a few days ago I learned that fence-building was not the only purpose for which the rock of Springfield is used. On going to a dealer to buy some lime to use in spraying, I inquired the price. He replied, "85 cents per barrel for Hannibal and 95 cents for Springfield, which is the best and (quality considered) the cheapest in the market." So it seems that in gathering at Springfield to hold this meeting, we have come to the very fountain of all good things, and the best of

everything. And now, to have things harmonize, we should have the best meeting our Society has held in all the 40 years of its existence.

In order to make it such we cordially invite all present to come and bring their friends to all the sessions of our three-days' meeting, encourage the fruit-growers by your presence, and help to make this meeting one long to be remembered for its good work and lasting influence.

To speak at length of our great State in general would only be to enlarge on what I have already said about the "Queen City of the Southwest;" the best State in the Union, where we grow the best fruit in the world, so proven by the numerous awards and diplomas in our possession. Among our three million intelligent people who know how to live well, and who, by their experience know the beneficial effect to health in the free use of good fruit, we find the best home market for our fruit of any state in the Union. They not only buy a large part of the product of our own orchards, but annually pay out hundreds of thousands of dollars for grapes, pears and other fruits from New York, Ohio and California, all of which might and ought to be grown within our own borders, making not only a good home market, but our full share of the markets of other states and foreign countries, and the demand for Missouri fruit increasing as the years go by. Without rich, virgin soil, cheap land and superior natural advantages, no one may even guess to what proportions the fruit industry will grow to be in Missouri in the years to come.

There is no good and valid reason why Springfield may not become a second Rochester and one of the greatest fruit centers in the west. The fruit product of our State now amounts to from ten to twenty-five million dollars annually, and is destined in a few years to at least double this amount.

While much is due to individual effort in building up this great industry, no intelligent person who will take the trouble to review the fruit industry of Missouri, will fail to see that the State Horticultural Society has been the potent factor in developing the fruit industry of the State; and has already by the improvement of wild lands, the increased wealth from the sale of fruit and by giving employment to the laboring class, returned many fold to the State and her people for all the small appropriations made on her behalf. As an instance of what is being done, we point with pride to the strawberry fields of Sarcoxie, where recently ten thousand pickers found employment; and to our numerous orchards, where in the coming fall an army of one hundred

thousand will find employment in picking and handling our apple crop, which will run up into millions of barrels.

We also point with pride to the School of Horticultural, which has been established as a department of our State University, and the first of its kind ever established in the United States, where our young men and women may go and secure not only a book and theoretical knowledge of the science of horticulture, but a thorough, practical knowledge as well. And we trust the time is not far distant when we shall have horticulture taught in the common schools throughout the State.

As the country grows older, our insect enemies become more numerous and destructive, so much so that many become discouraged and are ready to give up and go into other pursuits. We think this is a mistake. I can think of no occupation that offers a more inviting field for work, or one that promises to pay better or more certainly on the capital and labor invested, provided both are directed by a thorough, practical knowledge of the business.

We are not here to invite you into the pursuit of horticulture, promising you a life of ease and freedom from labor. The very fact that fruit-growing requires hard, intelligent, well-directed labor is what gives value to our products and makes it possible to secure from fifty up to five hundred dollars per acre in a single year.

Let us then take on new courage and renew our efforts, remembering that work is God-like and God-given, and not a curse, but a blessing to our race.

What this country now needs to lift it out of the ruts is more constant employment for the twin brothers of prosperity—capital and labor. If it were possible for us to reconstruct society so that all our people could find steady employment at paying wages; if we could induce the horde of worthless tramps and vagabonds that infest our public highways that it is vastly better to work for an honest living than to eke out the miserable existence they now do; if we could persuade our laboring classes who now spend their hard-earned money in the saloon, the gateway of hell, to save the same and invest it in the cheap homes of Missouri; and if we could induce the youth, the young men and women, many of whom are waiting for the soft snap that will never come, to all go to work in real earnest, embrace the golden opportunity offered in our cheap fruit lands, secure homes and surround them with fruits and flowers, and with all that will exalt and embellish civilized life, how vastly better it would be for them, for our country and the world at large!

Let us remember that this world is one great workshop, in which each one is in duty bound to do their full share, and that in the profession of horticulture we have no room for the idler and no time for the grumbler.

In the beautiful words of Emerson, let us not forget

“How nigh is grandeur to our dust,
How near is God to man!
When duty whispers low, ‘Thou must,’
The youth replies, ‘I can.’”

N. F. MURRAY, Oregon, Mo.

Music by the Clover-Leaf Mandolin Club.

SECRETARY'S NOTE—While it is the aim and object of our society to encourage the broadest and freest expressions in all our papers, reports and discussions, yet we want it distinctly understood that the society is in no way responsible for the statements of any one man. Every man is his own author and his words are his own views only. Location, surroundings and experiences are much varied, and you must be your own judge, if it is best to make them yours.

L. A. GOODMAN, Secretary.

THE WOOLY-APHIS OF THE APPLE OR THE APPLE-ROOT PLANT-LOUSE.

Schizoneura lanigera (HAUSM).

SUMMARY OF RESULTS.

The experiments conducted by this Station during the past year on the wooly-aphis of the apple have given results which are briefly summarized as follows:

I. The limb or aerial form of this insect can be readily killed by one or two thorough sprayings with strong kerosene emulsion.

II. Apple seedlings, buds and grafts should be planted in a small trench filled with finely powdered tobacco or tobacco dust and lightly covered with earth. This will keep the wooly-aphis away.

III. Apple nursery stock should have a liberal supply of tobacco dust applied to the roots every spring in order to kill the wooly-aphis and prevent it from establishing itself there. It should be applied by removing some of the earth from around the roots, filling the excavation with tobacco dust and lightly covering it with earth.

IV. Newly cleared timber land should be cultivated in corn or other crop for two years before the apple trees are set out in order to kill the wooly-aphis that may be on the roots of the wild crab and allied trees.

V. Apple nursery stock should have the roots cleaned and dipped for a minute in strong kerosene emulsion in order to kill the wooly-aphis that may be there.

VI. In planting apple trees tobacco dust should be freely used among and over all the roots and close around the trunk in order to kill and prevent the wooly-aphis from establishing itself there.

VII. Every spring, as soon as settled warm weather appears, each tree should have a liberal supply of tobacco dust applied to its roots by removing the earth from around the trunk for a distance of two feet and four inches in depth, evenly filling this with the tobacco dust and covering it with earth.

VIII. The root form of the wooly-aphis may be cheaply and easily killed and kept away from an apple tree by the liberal use of tobacco dust. About five or six pounds of this substance should be applied as above directed to the roots of every infested tree, and one-half this amount should be applied in a similar manner each succeeding spring. Costing approximately two cents per tree per year.

IX. This insect may also be killed by injecting one fluid ounce of carbon bisulphide two feet away from the trunk on two sides of the tree, but the use of this substance is not advised except in extreme cases, since a little carelessness may injure the tree, and it is always necessary to immediately treat the trees with tobacco dust in order to keep the insect away.

GENERAL REMARKS.

The apple-root plant-louse, or wooly-aphis, as it is called throughout Missouri, causes little trouble in the apple growing sections of the northern half of this State, but in the southern half of Missouri it is believed that it does more injury to the apple orchards and apple nursery stock than any other insect now infesting that region. Judge W. R. Wilkinson, a prominent orchardist and a member of the State Board of Agriculture and of the State Horticultural Society, states in the January, 1897, number of "The Southwest" of Springfield, Missouri, the following: "I consider the wooly-aphis the most destructive insect that the apple grower of South Missouri has to contend with, and is killing and destroying more trees in this section than all other causes combined."

Since the southern half of Missouri is largely devoted to fruit interests and is now known throughout the United States as "the home

of the large red apple" it at once becomes apparent that if one can control this pest, it will result in the saving of many thousand dollars each year to this State which now ranks third in the Union in its horticultural interests, of which the apple crop is its most prominent feature.

Heretofore in this State there seems to have been little attention given to methods of combating this insect, and few people have attempted to rid their orchards of this pest or to control and prevent its spread. It appears to be, however, comparatively easy to hold it in check and to be quite readily exterminated in a given area, as has been proven by the experiments herein described. (See under Remedies.)

In the northern and eastern portions of the United States and especially in Europe the form that infests the branches of the apple trees is the one that usually does the most injury, while in Missouri the form infesting the roots is the only one that does any injury whatever, the other being only occasionally seen, and when found, occurs only in small, unimportant, and isolated colonies.

INJURY, HABITS AND LIFE HISTORY.

The wooly-aphis of the apple, *Schizoneura lanigera*, (Hausm), is found in nature in two so called forms. One infests the limbs and twigs, while the other lives under the ground upon the roots. Entomologists designate the aerial form "wooly-louse of the apple," and the subterranean form "apple-root plant-louse." Some entomologists have described these two forms as distinct species, but at present all appear to be agreed that these two forms are the same species, differing only in habits. The laboratory experiments conducted at this Station with this insect go to show that the root inhabiting form will, under certain conditions, establish colonies upon the branches or limbs and there thrive in a perfectly natural manner, and vice versa.

The presence of the aerial form of the wooly-aphis is readily detected by the bluish-white cottony or downy looking substance that is excreted by and covers the greater part of each wingless individual aphis; and since these insects live in clusters or colonies, the patches of white matter are very conspicuous, and can scarcely escape the notice of even the most casual observer. It has been my experience to find in nature this aerial form in Missouri only in rare cases, and then only in those places where some injury had caused an abrasion of the bark, or some limb or twig had been cut or broken off, or where they had been crowded from the ground up to the base of the trunk or on the suckers that had been allowed to grow around the tree. They are frequently artificially induced to attack the trunk by mulching, or

by using wrappers around the base of the tree as a protection against borers and rabbits. But whatever may be the cause of their presence above the ground, the result is the same, namely: to cause an abnormal growth of the infested portion resulting in the formation of a rough and pitted surface, and at times cause the death of the limb at the point infested. However, this injury is so slight in this State that it is insignificant in comparison with that found in the northern and eastern states, and especially in Europe, where apple trees are frequently killed outright by this aerial form.

The presence of the root inhabiting form is readily detected by removing the earth from the roots near the trunk of the infested tree. The appearance of a bluish-white cottony or mildew looking substance, or of knotty and distorted roots will indicate its presence. It is this root or subterranean form that causes so much damage to the apple orchards in the southern half of Missouri, and to apple nursery stock throughout the State. The infested apple tree appears sickly; it does not grow as it should; its leaves are less numerous and they have more of a pale green or yellowish color than is natural; and finally the tree dies outright or is blown over with the first slight wind. Such are the outward indications that a tree is badly infested with this pest. Sometimes the tree blows over with a heavy wind without showing these outward appearances in so marked a degree, but one soon becomes familiar with the appearance of infested trees and can readily locate them before they are past recovery. In orchards, it appears that the great bulk of the damage from this pest comes directly from the fact that the trees blow over so easily, the roots breaking off close to the trunk. Of course this is due to the fact that the roots have decayed; and I am fully convinced from actual observation that ninety-five per cent of the cases of so-called "root-rot" in apple trees in this State is in reality the result of the attack of the wooly-aphis. In nursery stock, the damage comes directly from the inability to sell badly infested trees, and not from the death of the trees themselves.

The wooly-aphis sucking the juices from the roots of the apple tree causes an abnormal growth of the attacked portion of the roots resulting in the formation of gall-like swellings or excrescences. These swellings are usually irregular and knotty in appearance and sometimes attain considerable size, while that portion of the roots between the excrescences is frequently undeveloped.

The wooly-aphis will be found in large numbers and in clusters over the surface of the swellings, and especially between them in the numerous crevices that the larger excrescences contain. The roots thus attacked, distorted and swollen soon begin to decompose; sap-

rophytic fungi and bacteria enter the dead and decaying portions and help to hasten the work, and soon that portion of the root perishes. Sometimes the root seems to be killed outright by the vast number of aphids sucking the sap and causing the abnormal growth, so that the attacked portion perishes before decomposition has fairly set in. But in either case the aphids perish or leave the dead root and seek living roots upon which they can feed, and hence, when one examines a root that has been dead for only a short time even, the aphids may not be found there, and this has led many to attribute the death of the root to other causes, especially to "root-rot." As the woolly-aphis attacks in immense numbers the main roots at or near the trunk, and as these roots are usually eventually killed and then rapidly decay, the tree loses its support and falls with the first wind.

It is remarkable how long an apple tree will manage to live after its main roots have been killed by the woolly-aphis. It puts forth numerous small rootlets that nourish the tree enough to keep it alive with about half the usual number of leaves, but these rootlets are not sufficient to hold the tree upright.

No variety of apple tree in Missouri appears to be exempt from the attack of the woolly-aphis, nor does the age of the tree appear to make any difference. It attacks and injures alike seedlings, nursery stock, young and old bearing trees, but very old trees appear to withstand this test much better than young ones.

This insect is well known to all fruit-growers in Missouri, and it needs no scientific description. A very brief statement of its life history may, however, be useful. The adult insects are found in two forms, as can be seen by carefully examining a colony late in the summer. One form has wings and does not excrete the downy matter, while the other and more numerous form has no wings and excretes from the pores of its abdomen the bluish-white downy or cottony matter that covers the insect and renders it so conspicuous. If this downy substance be touched, it will be easily removed from the insect, which will immediately excrete more.

The solitary eggs of this woolly-aphis may be found during the winter in the crevices of the bark at or near the base of the tree, where they are usually seen completely enveloped in the dead skin of the mother who lays the single egg. In the spring these eggs hatch into wingless, agamic females. These females then bring forth living young rapidly and without males—parthenogenetically. These young are also always wingless, agamic females. Their offspring do likewise. This is continued during the summer, each generation being apterous agamic females only. Toward the latter part of summer winged, agamic

females are developed. In the station laboratory breeding cages these winged forms first appeared on the 26th of August. Some of the winged forms leave the infested tree and fly to other trees, where they establish another colony by bringing forth living young. Late in the fall, toward the approach of cold weather, some of the agamic females bring forth living, wingless and mouthless true males and females. These pair and the females each develop a single fertilized egg and perish.

Each aphid, whether winged or wingless, is independent, and derives its nourishment by piercing the bark with its long beak or mouth-parts and sucking the sap below.

In the northern part of Missouri most of the woolly-aphis perish during the severe cold of winter, and the eggs are frequently the only means of continuing the species the following summer. In the southern half of the State, however, the aphids themselves are usually able to hibernate in large numbers, and hence it is that we find this pest so much more numerous in that section. One may easily verify this statement by examining the lower roots, near the base of the infested tree, during the winter. I have seen hundreds of them alive and active in such places every month in the year; but they appear to feed very little, if at all, during the winter, beginning to feed at the first approach of warm weather in the spring. Each hibernating aphid commences to bring forth living apterous, agamic females just as soon as warm weather is established; and as hundreds of them may hibernate on the roots of a single tree, it is readily understood why this insect is so numerous in South Missouri.

But in order to determine whether or not the limb form would spread to and infest the roots, some woolly-aphis from the limb of an infected tree in Jackson county were obtained and introduced June 28, on the limbs of the young apple trees in the other two root cages. The trees contained no insects except those placed on the limbs. The root-cages were isolated in large breeding cages in the green-house. In the course of a week the aphids had established flourishing colonies on the branches, and at the expiration of a month they had spread down the trunk in scattered and isolated places, and in one case had attacked the roots near the trunk. In two weeks more the roots of all the trees had several well-established colonies upon them.

From these observations and facts it is believed that what little of the aerial or limb form of the apple tree woolly-aphis we have in this State is now derived from the root form. Of course, it will be understood that I do not imply by this statement that the original form of this aphid was root inhabiting, for I am decidedly of the contrary opinion.

NATURAL ENEMIES.

There are several species of insects that are either parasitic or prey upon the apple tree wooly-aphis and tend to hold them in check. It is doubtful, however, if they are of much value as a rule in checking the root inhabiting form in this State, since they have not as yet been observed in nature in sufficient quantities to cause any apparent diminution in the number of aphis. It requires considerable searching to find them at all, although most of the forms are frequently seen.

A minute Chalcis-fly (*Aphelinus mali*, Hald) is parasitic on the wooly-aphis, and could if it ever appeared in sufficient numbers, greatly diminish the number of aphids, but no case has been observed where this has actually happened. This insect is so very small that it will escape the notice of the ordinary observer.

The Root-louse Syrphus-fly (*Pipiza radicum*, W & R.) is frequently found in the larva stage busily engaged in feeding on the root form of the wooly-aphis. The adult fly might be mistaken by the orchadist for the common house fly, but the larvae may be recognized among a colony of aphids by the dirty, yellow-colored, spindle-shaped body from one-fourth to one-half an inch in length, abruptly tapering at the tail end and gradually tapering at the head end, and by the transverse ridges encircling the whole.

The larvae of a small Lady-bird beetle (*Scymnus cervicalis*) have been found feeding on the aphids near the surface of the ground, but as these larvae also excrete wooly matter which covers their backs, it is difficult to distinguish them from the aphids themselves.

The larvae of the Lace-winged flies (*Chrysopa*) are often found greedily devouring the aphids, but they, like the larvae of the lady-bird beetle, seem to prefer to work in the open air, and are not sufficiently numerous under ground to hold the aphis in check.

Some spiders spin webs over the aerial colonies and devour the aphids at leisure, and it is probable that our freedom from this form of the wooly aphis is due largely to the spiders and parasitic and predaceous insects.

REMEDIES.

The experiments with remedies to kill and control the wooly-aphis of the apple tree were conducted in the laboratory and in the field. It is not necessary to discuss the laboratory methods, since the field experiments are final and were conducted in order to check and prove the value of those carried on in the laboratory.

The aerial spray of the wooly-aphis can be easily killed by one or two thorough sprayings with strong kerosene emulsion. If the aphis

are on the trunk only, as frequently happens when the wooden wrappers are used as a protection against the attack of borers, they can be killed by washing the trunk with the emulsion by means of a white-wash brush.

Kerosene emulsion is made as follows: Dissolve one-half pound of hard soap in one gallon of boiling water. Rain or soft water should be used for this purpose, otherwise "break" the water by adding washing soda. Remove the water from the fire and add two gallons of kerosene. Churn this mixture for ten minutes by means of a force pump—pump a solid stream of the mixture back into itself. The liquid will assume a milky appearance, increase about one-third in bulk and become thick and creamy. Be sure to churn for ten minutes, otherwise the mixture may appear to be perfectly emulsified, when it is not, and the kerosene will separate and rise and the material and labor will be lost. This emulsion should keep indefinitely in this concentrated form. When it is to be used, add nineteen gallons of water to the above, mix thoroughly, and apply as stated.

It is the root inhabiting form that is difficult to manage, but it is believed that we can now control this pest cheaply and easily. Undoubtedly the root form can be killed by saturating the ground with kerosene emulsion, but this is extremely troublesome, difficult, expensive, and in most localities impossible to accomplish on account of extensive orchards and the scarcity of water; then again it is practically impossible to reach all the aphids under the large roots around the base of the tree where they are protected. Pure kerosene should never be used for this purpose.

Some commercial fertilizers tend more or less to kill these aphids and keep them away. Salt and potash mixtures are useful in this respect, and where commercial fertilizers are used one will find nitrate of soda, kainit or muriate of potash of great value. It requires about ten pounds of kainit or five pounds of muriate of potash to a six-year-old tree, and this should be evenly distributed around the tree as far as the main roots extend. Judge W. R. Wilkinson, of Altenburg, Missouri, has used concentrated lye with good results so far as the trees themselves are concerned, and if not too expensive, this may prove of value. Wood ashes are also good.

From what has been determined by actual experiments in the laboratory and in orchards and nurseries, it is certain that carbon bisulphide and especially finely powdered tobacco or tobacco dust, as it is called, are the two great remedies to be used against the root inhabiting form of the woolly-aphis. Unground tobacco stems or coarse tobacco will not answer; it must be finely powdered.

In the case of apple seedlings and common apple nursery stock I should not advise the use of carbon bisulphide. Unless extremely cautious, there is too much danger of killing the trees. In these cases the young trees can be kept free from the wooly-aphis by the liberal use of finely powdered tobacco. Small trenches should be dug and filled with a liberal supply of the tobacco dust covered with a little earth, and the seedlings grown in these. In planting nursery apple grafts, buds, or small trees, furrows should also be dug and filled with a liberal supply of the tobacco dust covered over with a small quantity of earth, and the plants set in these. Then every spring, just as settled warm weather appears, the young trees should be treated again by making a furrow along each side of the rows close to the tree—say two inches—filling this with the tobacco dust and covering it over. Two boys, one to make the furrow, which can be done with a hoe nearly as fast as one can walk, and to cover it after the second boy has filled it with tobacco dust, will apply this material to several acres of nursery stock per day.

The tobacco dust will leach down with every rain and more or less saturate the earth about the apple tree with nicotine, which will not only kill every aphis that may be there, but will prevent others from entering, and at the same time act as a strong fertilizer to the tree. Tobacco dust is worth what it now costs—one cent per pound—as a fertilizer, and is worth much more as an insecticide against the wooly-aphis. The Station is indebted to the Olden Nursery Company through the kindness of Mr. S. R. Hammond, who not only placed a badly infested field of nursery stock at our disposal, but who also greatly assisted us in the experiments.

Since the wooly-aphis damages nursery stock and causes a financial loss principally from the fact that the young trees that are badly infested have distorted, swollen and knotty roots, and are not merchantable, it is far better to prevent the aphis from ever attacking the trees than it is to kill them after they have caused this characteristic condition of the roots, for the real damage is then done and cannot be cured. If the trees that are being sold or put in cold storage are infested in the least—and this can be detected not only by the character of the roots, but also by the presence of the bluish-white downy or cottony matter—the roots should at once be cleaned by shaking and then thoroughly dipped for a minute in strong kerosene emulsion. This will kill the aphids; and it should be practiced not only by every nurseryman, but also by every person setting out apple orchards, even though the trees may have been so treated by the nurseryman.

Through the kindness of Judge W. R. Wilkinson, of Altenburg, Mo., the Station was not only enabled to make experiments with carbon bisulphide and tobacco dust in his apple orchard consisting of ten-year-old bearing trees, but we received valuable assistance in the experiments from his personal attention, and from the help he placed at our disposal.

On the 29th of June, 35 trees in his orchard that were suffering the most from the wooly-aphis, and some of which no doubt would have died soon, were selected for the following experiments: Twenty of these trees were treated with carbon bisulphide. This was injected into the ground close to the trunk of the tree by means of the injector to be described later. The quantity injected varied from one to three fluid ounces per tree, and was injected in one place on some, and in two and in three places on others. The result was that within a month every tree was either wholly or partially dead. Wherever the liquid carbon bisulphide came in contact with the tree, it killed that portion of it. Hence extreme caution should be exercised in using this substance. Profiting by this experience, other and more extended experiments were immediately undertaken at the Olden Fruit Farm, with the same substance, but this time with success. These experiments are described later.

The remaining 15 trees in Judge Wilkinson's orchard were treated with tobacco dust in the following way: The earth was removed with a hoe from around the trunk of a tree for a distance of two feet and to a depth of four to six inches. In this excavation was evenly distributed from two and one-half to five pounds of tobacco dust, care being taken to place it close to the trunk also. The tobacco was then covered over with the earth to prevent the wind and rain from displacing it. In removing the earth from around these trees it was plainly seen that they were very badly infested with the wooly-aphis. On the 15th of August these same trees received another equal supply of tobacco dust. On the 30th of October I visited the trees in company with Judge Wilkinson and most carefully inspected them. Out of the 15 trees thus treated only two were found that had any signs of living wooly-aphis on the roots, and these two trees had but one small colony each at the surface of the ground on some small roots where the tobacco had evidently not been applied close to the trunk. These two trees had been treated with two and one-half and three pounds of tobacco dust respectively. As far down as we could well dig, the aphis had all been killed. None of the trees treated with the tobacco dust died or were injured. This orchard is on the side of a steep hill. Thus it will be seen that in this case very badly infested 10-year-old apple

trees were freed in one season from the wooly-aphis by means of the tobacco dust alone.

Through the kindness of Col. J. C. Evans and Dr. Paul Evans, we were enabled to conduct experiments on the wooly-aphis in the extensive apple orchards of the Old Fruit Farm. These gentlemen also kindly placed at our disposal a reliable assistant, and aided the experiments in every possible manner.

For the tobacco experiment fifteen young bearing apple trees that were suffering more than the others from the wooly-aphis, were selected. Each tree had the earth removed from around the trunk for a distance of two feet and about four inches deep. Tobacco dust was then evenly distributed in each of these excavations and covered with the earth. The amount of tobacco dust used was three, four and five pounds, each to five trees respectively. These trees were thus treated on the twenty-second of June; and an equal amount was placed around them again on the fifteenth of August. In company with Col. J. C. Evans and two other gentlemen, I visited and carefully inspected these trees on the twenty-fourth of October. The earth was removed from the main roots around and under the base of the trees as far down as was practicable and necessary in order to ascertain the results of the experiment. In no case could a single wooly-aphis be found, not even under the trunk and in the sheltered places, whereas they had appeared in immense numbers when removing the earth to first apply the tobacco dust.

When first applying the tobacco dust to some of these trees, they looked so sickly, and were so badly infested that the gentlemen assisting me said it would be a miracle if they did not soon die in spite of anything that could be done. Some of them appeared to be more dead than alive, but they all lived and recovered. Not a treated tree was lost.

Thus it will be seen that the results of this experiment fully confirm the results obtained in Judge Wilkinson's orchard.

Having killed the trees treated with carbon bisulphide in Judge Wilkinson's orchard, and profiting by that experience, the following experiments were undertaken in a young bearing apple orchard on the Olden Fruit Farm:

On the 25th of August, thirty very badly infested apple trees were selected, and carbon bisulphide injected into the earth at the roots of each of the trees by means of the injector, and in the following manner: Five trees each received one fluid ounce of the liquid injected one foot away from the trunk on three sides, and five other trees each received the same treatment, except that the liquid was injected two

feet away from the trunk. Each of these ten trees, therefore, received three fluid ounces of the carbon bisulphide. Five more trees each received one fluid ounce of the liquid injected one foot away from the trunk on two sides, and five other trees each received the same treatment, except the injection was made two feet away from the trunk. Each of these ten trees, therefore, received two fluid ounces of carbon bisulphide. Still another group of five trees received one fluid ounce each injected one foot away from the trunk on only one side, and another five trees each received the same treatment, except the injection was made two feet away from the trunk. Each of these ten trees, therefore, received one fluid ounce of the carbon bisulphide.

On the 24th of October these trees treated with the carbon bisulphide were also inspected and examined by Col. J. C. Evans, two other gentlemen and myself. We could find no aphids on the roots of any of these trees, except those that were injected on one side of the trunk only. On all such we found living aphids on the untreated side. There was no apparent difference in the results between those treated with two or with three injections, nor between those injected one or two feet away from the trunk. In no case could any injury to the trees be observed. This being the case, I should advise one to always make the application two feet away from the trunk and on but two sides.

The injector used was very convenient, and enabled us to place a known quantity of the carbon bisulphide in the earth near the roots without wasting the liquid and with considerable rapidity. The McGowen injector was merely modified to adapt it to orchard work.

From the above experiments it is evident that there is great danger of injuring the trees in using carbon bisulphide unless one is careful to make the injection at least one and preferably two feet away from the trunk. However, by the use of an injector that will inject one fluid ounce, and by injecting two feet from the trunk on two sides of the tree one can readily kill the wooly-aphis and not injure the tree. The injection should always be made when the earth is dry. If it be at all wet the fumes of the carbon bisulphide will not penetrate the earth to any extent, but will be lost. Carbon bisulphide evaporates very rapidly and the fumes are heavier than the air, and in a dry soil they will penetrate and kill all the aphids for a considerable distance from the point of injection. In inserting the injector it will occasionally strike a large root just below the surface of the ground. In such cases remove it and make the injection to the right or left so as not to allow the liquid to touch a main root. The depth to inject varies

from six inches to one foot, according to the size of the tree and the condition of the soil.

Carbon bisulphide can be purchased in bulk for 10 cents per pound, and, if used as above directed, it will cost 11 cents for the material to treat one tree. It must be understood, however, that the carbon bisulphide only kills those aphids that are there at the time the injection is made; its work is done in a short time, and the fumes soon disappear, and there is then no reason why other colonies should not establish themselves on these same roots. To prevent this, one should apply, as above directed, about two pounds of tobacco dust to each tree either just before or within a few days after the injection of the carbon bisulphide.

The use of the carbon bisulphide is not advised except in bearing orchards or in extreme cases such as where the trees are very badly infested and it is very desirable to kill the aphids at once. The use of tobacco dust is always necessary in order to prevent the aphids from again establishing themselves, and since this is the case, it is no more trouble to apply a larger quantity of tobacco dust and kill the aphids all with one operation. The tobacco dust works slower than the carbon bisulphide, but it not only kills the aphids, but it also remains about the tree, and prevents other colonies from forming. It costs from 3 to 5 cents per tree to kill the aphids by means of tobacco dust, but it will cost only about one-half that amount each succeeding year to keep them away. If we take into account the cost of the material and the trouble of making the injection of carbon bisulphide and the cost of the tobacco and trouble of applying in order to keep the aphids away, we shall find that the cost and trouble of applying only the tobacco dust in the beginning is about the same. Hence I would advise the use of finely powdered tobacco or tobacco dust as a means of killing the root inhabiting form of the woolly-aphis on apple trees, and would urge its use every spring as a preventive. Always apply the tobacco dust, as above directed, by removing the earth from around the trunk of the tree for a distance of 2 feet and from 4 to 6 inches in depth, and evenly distribute the tobacco in this excavation, taking care to place it close to the trunk also, and then cover it with the earth.

Judging from the experiments above described, it is believed that the liberal supply of tobacco dust, applied as stated, will cheaply and effectually kill and hold in check the woolly-aphis and prevent serious injury from this pest. The experiments with tobacco dust as a means of controlling this insect will be continued for several years by using a

definite quantity each spring about the roots of the same trees in order to ascertain its full value.

In planting an apple orchard in newly cleared timber land, it is advisable to cultivate the land in some other crop, such as corn for two years before the apple trees are set out. This will kill the wooly-aphis that may be on the roots of the wild crab and allied trees, which would otherwise infest in great numbers and seriously injure the young apple trees.

In all cases it is advisable to thoroughly drench the roots of apple stock in strong kerosene emulsion by placing them in the mixture for a minute in order to kill what aphis may be there. This should be done by the nurseryman when the trees are first dug, or by the orchardist just before planting them. While planting, each young apple tree should have a liberal supply of tobacco dust placed about and over the roots and close up to the body, and a little earth covered over this tobacco. Then every spring, just as soon as settled warm weather appears, each tree should receive a quantity of tobacco dust applied in the manner previously stated. The amount should be about one pound the first spring, and should be increased each spring until the tree receives about three pounds when six years old, after which the amount need not be increased unless found to be necessary. If the above directions be followed, I do not think the wooly-aphis will damage an apple orchard.

The experiments above described seem to me to prove that the wooly-aphis infesting the roots of apple trees is as cheaply and as easily controlled as most other injurious insects.

Tobacco dust can be obtained from the Hill-Settle Tobacco Co., of St. Louis, Mo., or from the A. B. Mayer Manufacturing Co., of St. Louis, Mo. Carbon bisulphide can be obtained from the manufacturer, Mr. E. R. Taylor, Cleveland, Ohio, for ten cents per pound, in fifty pound cans.

The Station is indebted to the Kansas City, Fort Scott & Memphis Railroad Company for numerous courtesies and material assistance in conducting these experiments.

J. M. STEDMAN, Entomologist, Columbia, Mo.

Music—Piano duet—Mr. Von Troemel and Mrs. Burden.

ROSE CULTURE.

Mr. President, Ladies and Gentlemen—"Since the day when the Lord God planted a garden eastward in Eden and placed therein the pure and happy pair to tend it and to keep it, all of their offspring who retain some far-off touch of that pristine purity have found a garden a source of infinite pleasure.

"Nature is the material expression of God, who is spirit—and that most highly attenuated form of matter, or matter infused with spirit—which we call soul, incased in human clay, attests its kinship to Him the more deeply it feels its kinship to nature even in her simplest forms."

From time immemorial the rose has reigned as "Queen of Flowers," and its charms have been recounted in story and in song. There is no flower of the field or of the garden that appeals so universally to the aesthetic nature of man, and none, perhaps, which repays so well for careful culture.

Roses are natives of all the temperate parts of the northern hemisphere and of its colder regions, even to Lapland and Hudson's Bay. They are the chief favorites in flower gardens for the beauty and fragrance of their flowers, and more than any other flower emblems of everything beautiful and delightful.

Among the ancients the rose was sacred to Cupid and Aphrodite or Venus, and was the emblem of joy and love, and at the same time of prudence. Its opening buds are a favorite poetic image of innocence and purity.

The Hundred-Leaved rose was the variety best known to the ancients. It is a native of the Caucasus and has been cultivated in gardens from very ancient times. Other varieties were the Provence or Cabbage rose, the Damask, the Dog rose, the Multiflora and a few others. From these few roses of early times countless varieties, both single and double, have been developed by the ingenuity of the florist. The last decade of years has been prolific in the production of varieties that eclipse anything known to our ancestors. France has taken the lead in producing varieties of superior excellence. It would be too tedious on the present occasion to enter into any detail of the manner of developing these new and beautiful specimens of colors, form and fragrance. I only offer a few practical suggestions from the

limited experience of an amateur to whom the cultivation of flowers is a source of infinite pleasure.

I shall confine my remarks principally to the cultivation of the Bourbon and Tea, or everblooming roses, as they require more careful culture than the hardier varieties, attempting to present the conditions which will insure success in this latitude. It is impossible to produce such magnificent specimens as are found in California and the Southern states, but with the best conditions that can be supplied, fairly good results may be obtained, sufficient to repay one for the time, strength and means invested. The first thing is to decide what we want, and in making a selection one must be governed somewhat by the amount of space and the location.

A sheltered, sunny spot on the south side of a building or close fence, not too near large trees whose foliage and roots interfere with the growth of small, delicate plants, would be a suitable place. The plants may be arranged in borders or beds according to taste or convenience. If there is not good natural drainage, artificial drainage must be supplied by removing the soil to the depth of eighteen inches, and filling in with broken pottery, stones and other rubbish to the depth of four or six inches, leaving about twelve inches for soil.

To obtain the best results the soil should be rich, composed of loam, well-rotted manure, and a little sand. Having prepared the soil, the next consideration is to get good strong plants. Not only that; such varieties should be selected as will succeed in this latitude; for not all perpetual roses will survive the rigor of our winters.

It is a temptation when one goes to a green-house to select from the magnificent specimens of forced roses that the florist has, or to read the descriptions in the guide books, and order accordingly, never considering how impossible it is to supply out of doors in this climate the conditions of the green-house. The plants should be grown from cuttings, strong two or three-year-old plants. It is better to buy one dozen of the two-year-old than two dozen of one-year-old plants.

There will be a better yield of blossoms, and more of the plants will survive the winter. Another thing to consider is whether the varieties are prolific. Some of the tea roses are what the florists call "shy bloomers." The plants, under right conditions, produce magnificent roses, but they are "few and far between." The *Bride* and *Perle des Jardin* are examples. So these three things to guide one in the selection of plants should be considered, viz.: hardy varieties, vigorous plants, free bloomers. It is better, also, to buy plants which have been wintered in a cold frame, as the change to outdoor conditions will not be so great.

Spring is the best time for transplanting from the green-house or cold-frame, and not until after the 20th of April, setting the plants from twelve to eighteen inches apart. I prefer, as a rule, to get my plants from the home florists, so that I can select them myself, and then, too, the ball of earth does not have to be removed, and the plants are sure to live. I water freely when planting, afterward as my judgment dictates and according to the season.

Like everything else in nature, this royal beauty has its enemies. In this climate the green aphid and the slug are the worst. The green aphid is easily gotten rid of by spraying with the hose or rose-watering pot. But the slug is harder to manage. A few applications of some insecticide will exterminate it, however. Several recipes are given in the guide books: kerosene emulsion, tobacco solution, tobacco insecticide soap, whale oil soap and white hellebore. I prefer the white hellebore as being the simplest, cleanest and most pleasant to use. One table-spoonful of the powder to a gallon of warm water, prepared overnight and the plants sprayed in the morning with a rose-watering pot proves an effectual remedy. Generally two applications are sufficient, frequently only one is required. If the plants are kept in a vigorous and healthy condition they are less liable to the ravages of insects. I do not use any of the prepared fertilizers, but keep a compost heap, on which I put leaves, rakings from the yard, manure, etc., stirring occasionally. I sometimes use wood ashes sparingly. It is a good plan to save the soap-suds from the laundry and pour around the roots of the plants. It helps to destroy worms and insects in the soil, and is also a good fertilizer. It is good for sweet peas, nasturtium, asters and other plants, as well as roses. In winter I pour the suds on the compost heap. It is hardly necessary to say that the beds and borders must be kept free from weeds, watered daily during the dry season and the soil about the roots stirred frequently.

Roses are very susceptible to climatic changes, and in this latitude are better for winter protection. But one must be careful not to protect too much nor too early. Turf makes the best covering; but when that cannot be obtained, the next is to heap soil about the roots, and cover with leaves or straw, or both. One should discriminate in the use of leaves. The leaves of the soft maple should be used sparingly, as the texture is so fine they decay rapidly and hold too much moisture; they are fine for the compost heap. The hard maple and oak leaves are better; indeed, with the soil they afford excellent protection. The last of November is early enough, as a rule, to cover with leaves and straw. The soil may be put on earlier, and the covering should not be removed too early in the spring. Like winter protection, prun-

ing must be governed by the judgment, as different varieties differ very much in habit and growth. When the covering is removed in the spring all dead and discolored wood should be cut off, and throughout the blooming season the blossoms should be cut with long stems and all weak canes cut out. When plants fail to mature the buds, like the *Etoile de Lyon*, it is a good plan to remove a number of the undeveloped and imperfect buds and prune severely. As climbing roses produce their flowers on the old wood, none but the dead and weak canes should be cut out. It may be well after blooming to shorten some of the canes, however.

A few general remarks, and I will close. It does not follow that roses which are good for forcing in a green-house are good bedders; the reverse is more often the case. It is wiser, therefore, and more satisfactory to select such as will thrive under the conditions that can be given out of doors, although they may not be quite so handsome. It is a good plan, also, to duplicate the best varieties. Half a dozen of a kind would not be too many, if it is a highly satisfactory variety.

Do not put hybrid roses and tea roses in the same bed if it can be avoided. The hybrids are so vigorous that they are apt to absorb too much of the nutritious qualities of the soil, and besides, they do not look so well. It is better to make a hedge of the hybrids.

Added to these suggestions, "eternal vigilance" is the price of success with this "Queen" of the garden.

A list of such roses as I have been most successful with. A number of the plants I have had for 5, 7 and 10 years:

Marie Van Houtte, Francisca Kruger, Safrano, La Pactole, Mad. de Watteville, Bridesmaid, Countess la Barth, or Duchess de Brabant, Bon Silene, La France, *Etoile de Lyon*, Marie Guillott, The Queen, Clothilda Soupert, Souvenir D'un Amie, Lettie Coles, Hermosa, Malmaison.

MRS. J. M. HOLLAND, Springfield, Mo.

Mr. Geo. H. Van Houten of Des Moines, Ia., gave a splendid interesting talk on the fruits and flowers of Oriental lands.

WEDNESDAY, JUNE 9—9 a. m.

Opening prayer, Rev. John Brereton.

Announcement of committees.

COMMITTEES.

Flowers—J. C. Whitten, W. H. Barnes, Mrs. J. L. Holland.

Finance—S. W. Gilbert, N. F. Murray, J. T. Snodgrass.

Obituary—A. Nelson, Geo. W. Hopkins, C. Howard.

Final Resolutions—G. T. Tippin, F. H. Speakman, J. M. Stedman.

INTRODUCTION OF DELEGATES.

GLENWOOD, IA., May 27, 1897.

To the Missouri State Horticultural Society, Meeting at Springfield, Mo.:

GENTLEMEN—This will introduce to you Mr. Geo. H. Van Houten, as delegate from the Iowa State Horticultural Society.

Respectfully,

F. M. POWELL, President.

Mr. Van Houten was eloquent in his praise of Missouri's resources, saying that no state in the Union surpassed it in fertility of soil, range of products and purity of climate. A Chinese wall built around the entire State would leave Missourians still in possession of all the necessities of life with the material resources for a vast empire of wealth and civilization. The speaker was born in the noble State and never failed to resent ridicule aimed at Missouri.

The following delegates, Mr. W. H. Barnes, Secretary of the Kansas State Horticultural Society, and Mr. Bill of Benton county, Ark., were then introduced by the President to the members of the Society and invited to take part in all the proceedings.

VARIETIES OF STRAWBERRIES.

Mr. Chairman—I see you have me on the programme for a paper on "Varieties of Strawberries." I regret I did not communicate with Secretary Goodman at once, and have the subject assigned to some one more competent.

My limited education forbids my attempting this task, and it is really a trespass on the educated of this great State.

The varieties of strawberries are hundreds, but as a rule, only a few are adapted to all the different soils and locations of this State.

What I shall say will apply entirely to my own locality and to the varieties I have had success with.

The best variety for any one to plant is the one your neighbor across the lane has made a success. Then try as many other varieties as you care to in a small way.

I have planted a good many varieties, and now have several new ones which I am testing.

The varieties that we do best with are as follows: The Crescent, polanized with Downing; Jessie, Mitchell and others. Sharpless, Perfect, Bubach No. 5, polanized with Jessie, Captain Jack, Vandeman and others; Warfield polanized with Captain Jack, Vandeman, Jessie and others, and Bedarwood. The Gandy is the best late berry. The Crescent is a rank grower, a good bearer, and the first few pickings are large, fine berries, but the last are too small to ship for profit, so I have discarded it. The Bubach is an abundant bearer of large and fine berries through the season, and it is a medium good shipper. The Jessie is irregular in size and ripens irregularly; (will discard it.) Captain Jack, Vandeman, Bedarwood and some others are used only for polanizers. The Warfield is the best thus far—good size, dark color, glassy and firm, heavy bearer and the best shipper. The Gandy is the best late berry, and is large, of good shape, a strong plant and a good bearer. The new varieties I will pass.

Mr. Chairman, this is all I have to say about varieties in this paper. I will give some of my experience and present a plan of growing the strawberry.

How I cultivate and manage the strawberry. I cultivate the land thoroughly the year before planting; spread manure over the land in the winter, 15 loads to the acre. I have plowed the present crop three times and harrowed up to March 15, 1897. Marked it off 4x4½ feet with a small plow and set plants at the crosses. I plow to June 1st once each week, then hoe and take off all runners and the blooms that have been missed; will continue to plow both ways (deep) until the runners begin to set freely, which will be about June 20. Will hoe and layer the runners; allow six and not over eight from each mother plant. Layer the runners from the young plants until they almost come together in the rows and layer each way of the rows to 20 inches, making the row 40 inches and leaving a passway 14 inches. The layers are placed from 6 to 10 inches apart, average 8 inches apart all over the rows. Then allow no more runners to set, all others should be taken off; hoe frequently, keep down the weeds and grass and cut off the runners; keep the plow going regularly as long as the runners are not in the way until about frost. In the winter mulch with straw free from seeds. That used for bedding the stock in the barn is best.

I have grown berries successfully in this way and expect to have these five acres correct. The commercial berry-growers will readily see the object of my plan. My plants will be large, have plenty of room; will produce a heavy crop of large, fine berries that will sell on

any market. Let everybody figure and see the result: About 2,500 hills to the acre (say 2,000 to the acre), about 25 plants to the hill, making 50,000 plants to the acre. Each of these plants will give one large berry per day for 20 days (say 10 days), making 50,000 berries per day, 25 large berries per box, say 50 berries per box. This gives 1,000 boxes daily, or 40 crates for 10 days, or 400 crates for 10 days' picking from one acre, net \$1 per crate, \$400.

What is the use to plant 1,000 acres, as Sarcxie has done, to realize \$100,000 and then get beat in prices in all the markets by all the small growers.

Just plant 250 acres, as Exeter has done, and make \$400 per acre and get the \$100,000 and be at the top of the market, with customers everywhere wanting our berries.

G. G. JAMES, Exeter, Mo.

STRAWBERRIES.

I have been growing berries in a small way for several years. Last spring I planted about one acre, or perhaps a little less, about half Bubachs and Haveland, with Bedarwood, Downing and Jacks for perfect bloom. Now, as I have always held that a perfect mechanical condition of the soil was better than much manure, I cultivated them until I almost felt like the soil was good to eat.

This land had been in cultivation 30 years, and to my certain knowledge has never had one shovelful of any kind of manure put on it, or has it ever been in grass. I made my mated rows about 18 inches wide and covered them lightly with straw about a week before Christmas. Most of them came through the straw without moving it. The Haverlands showed the most excessive case of over-bearing that I have ever seen, running from 25 to 150 to the plant, so I thought they would be a failure sure; but when the bloom was at its best we had three or four of the finest days for fertilizing I have ever seen; so they set the most perfect crop of fruit I have ever seen; so I went to work and mulched a part of them with short straw and chaff from an old stack near by. Result, as far as mulched, they perfected almost every berry, and second and third pick ran about 30 to the box, some of them 14 to the box and many 17 to 20. Now, if I ever live to have another patch I will mulch them if I have to go 20 miles after material to do it with.

Now, don't some one jump at a conclusion and mulch any kind of land too early and cause the loss of his crop, for we had a rain here that the water was 5 inches deep on part of my patch after the first

picking, so you see where I would have been if my land had not been well drained; but the water was all gone in 20 minutes after it quit raining. Well, I see I can't cover what I was aiming at by writing, so will let up.

Capt. Jack nearly a failure; also Bedarwood; Downing, big crop, Crescent, big yield, but went down with wet, muggy weather; lost most of them; Bubachs only set about half crop, owing to big rain when bloom was best; some very fine berries and lots of button. They would have been immense if they had bloomed with Haverland, but they were about four days later and caught the big rain. Michael bore the largest crop I have seen on it. Of all the berries on my land Haverland is worth them all; although it looks tender, it carries and holds its color better than anything I've seen, except Bidwell, and it is a very poor bearer with me. We have a bona fide trade of several hundred dollars with the better class of Plattsburg, and they want Haverlands first, last and all the time. Well, my experience is that plenty of plants, well distributed, are much better than extra heavy slants. We picked about 7,000 quarts off of a little over an acre, and about one-third of them were Haverlands, although there was less than one-fourth Haverland plants. Have Timbril, Brandywine, Parker, Earl and Greenville planted for next year. The apple crop will be very light here. Peaches are falling badly since the weather became so hot. Grapes look well. Blackberries and raspberries are immense as far as I have heard.

G. T. ODOR, Holt, Clay county, Mo.

PLANTING—CULTURE—VARIETIES OF STRAWBERRIES.

In presenting this paper before this body of berry-growers I enter the field with the expectation of some criticism by those who have had more experience in this calling than I have. But I must say with some degree of pride that after twelve years' growing of berries, and at the same time cultivating an experimental ground in a small way, I feel like I may be heard with the rest of those who have devoted their time and energy in the growing and improving of this the best of all berries. But I cannot say that it has all been smooth sailing—"nay, verily." I have had many disappointments, and have learned more by my failures than by the success I have ever had, and if we berry-growers would write and talk more of our failures than we do, we would keep many an anxious novice from stranding on the "sand-bar" that we run aground on. Experiments are sometimes expensive be-

sides the annoyance of being disappointed. I can call back to mind many instances of such disappointments, one in which I paid a tree agent \$3 for 100 blackberry plants and cultivated them three years and gave a dorky 50 cents to dig them up and throw them over the fence. They were wild ones. So much for that agent. I have paid as high as 50 cents each for strawberry plants and after cultivating them two or three seasons plow them under for fertilizer, and some of them have been of so poor a quality that I doubt if they made good fertilizer.

The strawberry has its peculiar notions "same as under beople," and in its cultivation, soil and climate has much to do with its thorough development. A variety that do well on one kind of soil may prove worthless on a different soil, even with the same kind of treatment. It is an old maxim among strawberry growers than any soil that will produce a good corn crop will raise a fair crop of berries, and perhaps this will hold good with certain varieties and in the hands of an expert, but I find much good corn land that is not naturally adapted to strawberry culture, and berries can only be made to grow by artificially bringing the soil to that point of fertility that they require. I have seen corn grow fine on what is called wet bottom land. While every strawberry grower of experience knows that the strawberry plant cannot stand wet feet and be healthy. The best soil for strawberries is a high, dry, timber land, and the higher the better, provided the soil is deep and rich; if not rich, make it so by a liberal application of well-rotted barnyard manure. To get best results I should the year before setting plant the ground to some hoed crop that it might be kept free from weeds. In early fall plow the ground with a turning plow, breaking it much deeper than if preparing it for corn—that is, if the deep plowing did not turn up too much sub-soil; if it did, do not plow so deep, but follow each furrow of the turning plow with a large single shovel, running it in the bottom of the furrow left by the turning plow and run it as deep as a good, strong horse could pull it; this breaks up the hard pan under the soil and forms a kind of under drainage without throwing the sub-soil on top. Cover the surface with manure and leave until spring. In spring rebreak, turning the manure well under, pulverizing the soil thoroughly. Set in rows four feet apart, with plants about two feet in the row. Plants should not be set until bloom buds begin to show or the first blooms to open, which should be pinched off, for if left to fruit the plant exhausts itself trying to ripen its fruit.

All plants should be taken from rows of the previous year's setting which have not been allowed to fruit. It is a mistake that many people make in taking plants from old beds that have borne one or more crops, as in the bearing and ripening of the fruit the plant becomes partly

exhausted, losing much of its vitality and the young plants from such parents, having a poor stock to draw from, are dwarfed and as a result the fruit in turn is dwarfed or of inferior size and quality. A succession for a number of years of taking plants from wornout beds will run them out until they will be worthless. This accounts for the complaint we often hear of: "Well, I set a new patch, but it don't bear like the old one did when I first set it." No; and if they will set a third patch from the second, after it has borne two or three crops, they will notice that they are not quite so good as the second and not near so good as the first.

As most all berry growers, and I believe all nurserymen advocate the setting plants as early in spring as the ground will do to work, perhaps I might right here give the reason this should not be done, and why we should wait until we can easily pinch out the bloom at the time of setting. That we may be understood, let us suppose that plants are capable of reasoning. When it wakes up in the spring, after its long winter nap, it starts out with the idea of trying to reproduce itself through its seed in the berry, it takes in the situation and sees that it has a firm footing, well rooted and at once begins to push its bloom above the ground and to open to catch the kiss of the morning sun, that it may be cherished and ripened, the seed fall to mother earth, catch and in turn produce a counterpart. Take up this plant, just as it has awakened, set it out and that same idea is in its little head, paying no attention to its footing, and by the time the bloom is where you can get it off hand, its poor little feet have grown weak, and it stands trembling in its new shoes, but let it stand in its old shoes until this time, then put it in a new pair, pinch out its bloom, and you have at once changed its whole plans. The next best thing it can do is to plant its feet firmly in the soil and try to reproduce itself by sending out runners and producing plants direct. The result is fewer plants die and a better growth in the early part of the season.

I believe that all understand that plants must be kept well cultivated, that no weeds or grass must be allowed to grow, and that it takes frequent and thorough stirring of the soil to keep them back, for if neglected for a time when plants are setting, the work become tedious and laborious, as the runner extends from the new to the parent plants. This brings us to the point of cutting the runners, and although I almost stand alone, let me enter my protest against early cutting. Let the early runners grow and set plants until, if cultivated in matted row, the row is thick enough, or, if under the hill system, the hill is full enough, then cut off all after runners the balance of the season.

Referring back to the reason faculties of the plant, we let it go on trying to reproduce itself by making plants until it has made all we want; then we again change its plans by heading it off in the cutting of the runners, which throws it back to its first idea of making seed, when it at once sets about to do it; but it reasons that the season is too far gone to ripen its seed and it can only prepare itself for next season by getting the fruit buds as near perfect as possible before going into its winter quarters. So by letting the early runners take root and cut the late ones all the plants are strong and have the crown well rounded, which means berries the next season.

As to varieties, I had intended to say something, but as we nearly all have our favorites and differ so much in our choice—perhaps on account of our diversity of soil—that I can only say what does best with me.

After testing perhaps a half hundred varieties I am now cultivating only the following: Warfield, Crescent, Lady Rusk and Bubach as pistillates, while for staminate I use the Sharpless, Mitchell and Gandy, though the Gandy is a very poor fertilizer. My preference is in the order named. I place the Warfield at the head of the list, with Bubach at the foot, for an all-purpose berry. The Gandy is a reasonable bearer when cultivated in hills, but it will not do to crowd it in matted row. It is a large late berry, of very firm texture, which makes it carry well for shipping long distances. The burr is large and coarse, holding them well apart, keeping them from bruising in the box, thus looking well at the end of their journey. The Mitchell is only fit for a fertilizer, as it bears too few berries of a very soft flesh, only fit for home use. I consider it the most over-estimated berry in cultivation, one in which the novice is sure to be disappointed, and even as a fertilizer it is much inferior to the Sharpless, the latter being a much stronger staminate, sending up its pollen-loaded, large blooms well above its foliage, enabling it to scatter or float its pollen without any interference of its own leaves. In getting plants to set, get them as close home as possible and don't forget the importance of getting plants from beds that have never borne berries, and above all avoid buying strawberry plants from fruit tree agents.

G. W. WILLIAMS, Humansville, Mo.

DISCUSSION ON STRAWBERRIES.

By Mr. Williams—In regard to brother James' paper on strawberries, and that point in regard to the Crescent seedling running down at the end of the season, now, I want to say that my experience has been

that, if it is fertilized with the Sharpless, it will hold up until the end of the season. The blooms on the Crescent are not good fertilizers, and do not do well with any but the Sharpless, and I have tried many varieties. The blooms of the Sharpless are strong and full of pollen, and my experience has been that the Crescent seedling, if fertilized with the Sharpless, will bear up well through the entire season, and they do not get too small with me for shipping. I have only one fertilizer, and that is the Sharpless.

By Mr. Hopkins—I agree with Brother Williams' paper in almost every particular, except in regard to the fertilizer; I do not know what the Sharpless may do with him, but with me it is a shy bearer, and I cannot get a berry out of it; I have tried it for two or three years, and if it did not get killed in the bloom it would almost always blast. I would like to ask Mr. Williams if he is sure that he is using the Sharpless? My experience is that it blooms early, but does not bloom long. It certainly is not characteristic of the Sharpless, so far as I have any knowledge of it. It is a good berry, the quality is unsurpassed, but I never heard of it being used as a fertilizer before, and the gentleman may have something else, although he may know what he is doing. I endorse the paper in almost every particular, and in regard to the subsoiling, I think that is one of the most essential points I have ever had any experience with in strawberry culture; I have for the last two years, and shall continue to practice subsoiling, it doesn't make any difference whether it is a dry season or a wet season, subsoiling seems to have a good effect. If it is an excessively wet season subsoiling seems to give a good under drainage, and I can tell the difference between the berries of those that are subsoiled and those that are not, the berries are firmer and hold up better; and in a drouth it is the same way; we all know it is good for a wet season, and I believe it is just as good for a dry one.

Now, in regard to the other paper that was read by the gentleman from Exeter, it sounds as if it was from a way back there; now when it comes to using Downing and such as that for fertilizer, it seems a long way back. The gentleman made some very large calculations but I am very much afraid it may turn out like Brother Freeman, he originated a new strawberry, and the way he figured, it would yield sixty-four thousand quarts a day.

By Mr. Williams—In regard to the Sharpless, I cannot say positively that I have got it, and I very much doubt if there is any gentleman here who could say he has got anything unless he originated the berry himself. My original stock of berries that I call the Sharpless, I sent to Ferry, Detroit, for them fourteen years ago. In patronizing

Mr. Ferry for our garden seed I noticed in his catalogue some strawberries mentioned. I sent for fifty plants called the Sharpless and that is what I am cultivating today. I agree with the brother who has just left the floor that the Sharpless is a shy bearer, but I believe today bears the sweetest berry in cultivation, at least my folks down at my house whenever they want to make a short cake or an extra good pie for a visiting neighbor, they always hunt out the Sharpless berries to make it, but it is a shy bearer and as I remarked in my paper I believe the same berries bear different on different ground, even under the same kind of treatment. Now, on my own place I find that certain varieties of berries will do better on one soil than another under the same kind of treatment exactly, and as Mr. James said the very best way for a novice to do is to try to get plants near home, where the soil is as nearly alike as possible.

As to my berry being a Sharpless I cannot tell whether it is or not, but it is a berry I got 12 or 14 years ago from Ferry, which he had listed as a Sharpless.

By Mr. Hilton—Regarding the Sharpless, it is an easy matter to know the Sharpless; it is different from almost any other berry I ever saw. I have raised them now for about seven years; mine came from Jud (or Judson) Summit, Arkansas, and there were about a hundred and twenty-five fruit-growers agreed that this was the Sharpless.

It is an easy berry to tell from any other; a shy bearer but a large berry and a good fertilizer. I have grown them when they would be almost from two to three inches in diameter; when you get a perfect berry, they are long and ripen first from the cap; the point of the berry will be the last to ripen, and sometimes they will rot before they get ripe if it is a very wet season and if they lay on the ground; sometimes the tip of the berry will rot before it ripens if they lay on the ground, but this has not been the case with me, for we have such stony ground they lay on the stone and don't rot. The Sharpless has a very thick heavy foliage, not a very dark green, while the Bubach has a great deal the same kind of foliage, but a darker green, and the stem that holds the berry is pretty long and holds up pretty well except when they get pretty heavy. I can tell the Sharpless wherever I see it. I have seen men who call the Dunn the Sharpless. I went to a man's place not long ago, and he was telling me that his Sharpless did not do well, and I told him he didn't have the Sharpless, and he said, "well, I bought them for the Sharpless, picked them for that and sold them for that," and in going through the patch we found a few of the berries; they were small and inferior, and I asked him if they had

a perfect bloom, and he said he didn't know whether they did or not, as he never paid much attention to the bloom.

The best fertilizer I have found for the Crescent is the Mitchell's Early; some will hoot at the idea of a Mitchell's Early for a fertilizer, but I have made more money out of the Mitchell's Early than any berry I ever worked with. About four years ago I planted two acres and a half, and I was short of plants. I went into a patch that was Mitchell's Early, Crescent and Sharpless; they had been planted in rows, but were matted pretty well together, and we put out about two and one-fourth acres of them, and we got them mixed; it was an average of about four Mitchell's Early and one Crescent and now and then a Sharpless. We put them out just as we took them up, and after we got all the Mitchell's Early planted we had not quite enough, so we got the Crescent and planted four rows across the field; where I planted one Crescent to about four Mitchell's Early they begun to bear the next year, and I found that those Mitchell's Early were the best Mitchell's Early I ever picked, and I had been using them three or four years before that; then it was about a week until the Crescent begun to ripen; just as the Mitchell's Early commenced to go down the Crescent came in and kept up my picking, and in the same patch we kept our picking up for about four weeks, and I had the best Crescents I ever saw, and at the end of the picking, about four weeks, I found a great many blooms on the Mitchell Early vines at that time and now and then that had been picked off of for four weeks, and they were as large as a hickory nut, and I did not find a blighted berry among the Crescent, and I did not find any of the Mitchell's Early that were imperfect, and I believe the Crescent is one of the best berries we have, if it is properly fertilized, and the Mitchell's Early is one of the best fertilizers I ever tried, and I have seen them bloom every month in the year except January. That is, of course, in a wet year. I like the plan of mixing them up all over the field promiscuously. If I want the most Crescent, I would put about two-thirds Crescent and one-third Mitchell's Early for a good crop; I have taken men in there just to see my Crescents; they would be terribly opposed to Crescents, and I would take them in just to show my large, fine Crescents. We commenced to pick about the 20th of April the Mitchell's Early, and it was about the first of May before we begun on the Crescent, and for four weeks we picked right there in that patch, and I do not know that I have seen an imperfect Crescent this season.

By Mr. Gilbert—I do not live very far from Mr. H. but I cannot grow Mitchell's Early; I have tried for two years and I believe if anyone wants to go into bankruptcy they ought to plant Mitchell's Early.

From the experience I have had I believe if I confine myself to about three varieties I will make more money out of them; the berries that have made me the most money are the Houston Gem, Greenville fertilized with the Comet. The Comet is a berry originated by Mr. Speakman, of Carthage. I think the Greenville is the best for an all around berry. The Houston Gem is earlier, almost as early as the Mitchell's Early, I don't think there is more than four or five days difference between them, and the Houston Gem will bear about twenty times as many berries as the Mitchell's Early and will ship just as well. They are not a very smooth berry, especially the first ones are a little rough, and have the appearance of being quite rough, but that may be caused by not having a fertilizer with them that blooms when the first blooms of the Houston Gems come out.

What is the matter with your Parker Earle? Mr. G. I cannot get any berries; I have plants this year with from three to four hundred blooms on a single plant and I wouldn't get a dish of good berries from the plant. Some years the Parker Earle does splendid but it is an uncertain plant to grow in South Missouri, at least on my place. The Jessie will give some fine berries but not enough of them. I have tested in the last five or six years I suppose a hundred or more different varieties. Our friend Williams in his paper advocates not setting the plants in the spring until after the bloom appears, and to pinch the bloom buds out before you set the plants. My experience has been that early planting gives the best results. If we have a little dry spell about the time the berries are blooming and the plants are set out then, you are apt to lose a good many plants, and if they are set early in the season there is very little danger of losing any of them.

If we were to undertake in Southern Missouri—and I did undertake it for two years—to let the first runners remain and form plants and make those plants 6 inches apart, set them out in rows and then keep all the late runners off, I don't think that work can be done for less than \$160 to \$125 per acre, and at the present low price of strawberries I do not think it would pay commercially. I shall in the future keep all the runners off until quite late in the season, say the latter part of July, and then let the plants make runners and form a matted row. In treating them in this way and setting the rows $2\frac{1}{2}$ feet apart, and when the soil becomes hard or beaten to use a cultivator to loosen the soil, I believe we can raise the berries cheaper than any other way I ever tried. The Charles Downing and Captain Jack are neither of any value to use in Southern Missouri.

By Mr. Tippin—To take the papers as they come I want to refer especially to the matter of runners, and wish to call attention of all

strawberry-growers that with the advice of the gentlemen must be taken into consideration the locality. It is true that Mr. Gilbert's home may have a month to six weeks, some times two months, longer season than we have on top of the mountains, and no doubt he will be troubled with an excess of runners, but I am satisfied that the best way to do in Greene county is to let the old runners stay. Last year was my first year to grow for fruit, and my advice was to cut off the first runners, but I did not obey that, and I don't believe there is a grower in Greene county that will claim they had a better plant patch than I have. As to varieties, I have just spent a month in the market in the northwest, in St. Paul, and while I am very sorry that I have not got any of my own, I am forced to say that the Warfield is the shipping berry. I have no Warfields planted and am very sorry. The Warfield is one of the best carriers, and while not the largest is one of the best colored and is the first berry they ask for when you go on the market—have you got any Warfield? The Gandy is the best late berry and best late carrier. Of course the Crescent is a good carrier but is too small as a rule. Our Sarcoxie friends are in the berry business and in the market and have largely Warfields, and that is why they beat us. The Bubach grown in Greene county is the finest I think grown in any market, the finest I saw from any section of the country. It is not a good carrier; it is all right for sale on the home market, but it does not ship well; it bleaches in some way and assumes an appearance of softness.

When we have solved the problem of the best fruit to grow, the best way to grow it and the best manner of shipping it, we are hardly half way through. When we have done all this we are not half way over the bridge, the matter of distribution and marketing are questions yet to be solved, and we shall have to make a wonderful advancement in the matter of distribution between now and next year in view of the fact of the increased acreage. Southern Missouri, Arkansas, the Hood river country and the Illinois section next year will overrun itself in view of the fact that the acreage in these sections will be nearly double; something will have to be done or our berries might as well rot in the field. It will be necessary to establish a grade; we will be forced to establish a grade for our strawberries and strawberries under a certain size must not be shipped; just to illustrate the way sections of country come in different—just as one section is going out of the market another section comes in. This section is going out, the last picking runs very small, yet they ship by car-load lots, that overruns the market just as the choice berries of another section are coming in, that ruins the prices of those berries and destroys the

market, but if we can establish a grade and enforce it we will make more money and all be treated fair and all alike.

By Mr. Murray—I think the papers on this subject were excellent and the discussions also were good. I want to emphasize a point or two about growing strawberries, and one thing is to prepare the land a year before planting, and then in fertilizing and in using barnyard manure it should be composted to avoid getting your land covered with clover seed. I believe in subsoiling, or where the subsoil is deep and should not be turned up, then loosen it and let it lay. Land for strawberries should be nearly level and free from water, and should be where water don't have to pass over it, and then high land is free from white frost. I have found that an advantage is derived from mixing varieties closely. I have alternated the plants in the rows, every other one a different variety, and in that bed so far I have not found an imperfect berry. The Crescents are holding up fine. The Mitchell's Early was spoken of, and I want to say that in Holt county, in the deep black loam it is not worth anything at all. I stopped down at Olden and I found that where they have that fine red clay and more or less rocks, that the Mitchell's Early did well. Then I planted some Mitchell's Early on some hilly land, somewhat yellow, and this year I picked some fine berries. I picked the first ones about the 18th of May; that shows the difference in the time of ripening.

There is one other point I wish to speak of, and that is in regard to mulching and covering strawberries, and I will say in putting on the mulch always be careful to get straw or whatever you use free from weeds. If your land is free from weeds one year and then you take care and don't put on anything with weed-seed, you will find it much better, and then you can make part of your plants two or three weeks later by not uncovering at the same time. I tried it with berries mulched and berries not mulched, and the berries not mulched were from a week to two weeks earlier than those that were mulched.

Now in regard to the Warfield, I agree with nearly everything that has been said this morning; the Warfield is a great favorite of mine. Some one spoke of the advantage of high, dry ground. We must not forget that strawberries need to be set well with water, and yet they will not stand in wet land, but land that is well drained.

———— I cannot agree with Mr. Murray about mixing up his fertilizers in the rows. It may do in a home patch, but when it comes to picking berries for shipping, we don't want everything mixed up in the same box; it won't do for market. We want straight goods; if we want a box of one kind we want it all that kind. It is just like out in

the orchard and mixing all kinds of apples, and as sure as you mix them in the patch the pickers will mix them in the boxes.

In regard to Mitchell's Early, I am sure we would all have been in the poor-house if we had raised Mitchell's Early. Of all the varieties I ever tried that has been the most worthless. Capt. Jack is a good fertilizer. I will say that I am using Capt. Jack and Robinson, and this year I have not marketed any of but the Bubach.

Mr. Tippin struck the key note when he said we must drive out these small berries; the market now demands everywhere a good-sized firm berry, and the people must have it, and these people who have gone into the business and raise this little trashy stuff, and handle it in a trashy manner, will be driven out of business sooner or later, and the sooner the better.

By Mr. Van Houten—Some have referred to subsoiling or soil-lifting or loosening. I think those of you who are interested will find something illustrated in volume 31 of Iowa Reporter that will prove of interest to you, and if you want to invest in something cheap and unpatented in the way of a soil-lifter that will result with greater benefit to the crop, I think the one illustrated there would prove very valuable.

By Mr. Murray—I certainly did not wish to be understood as mixing the varieties to the extent mentioned in planting for market I would certainly alternate the rows. We have to get them reasonably close together if we want the best results; of course, I would not advise the mixing of anything for market, and I agree with the gentlemen and think the grading would be a good thing.

By Mr. Bell—I have the pleasure of belonging to the Benton County (Ark.) Horticultural Society where we are trying to get up a good society. The President of our Society is a large berry-raiser, he makes large shipments every year and has for the last ten years or more, and he asked me to try and ascertain from this Society what was the standard of a new berry called the Clyde, and I rise to ask the President during this meeting to ascertain whether it is known to deserve the reputation it has gained in the locality where it is being raised. We heard that one grower in Missouri has picked eight hundred crates from 2½ acres and was only about one-half or two-thirds done picking; that was the report that came to our society at the last meeting and I was requested to ascertain if that was a fact, and we felt interested in the matter on account of the reputation the new berry was said to have.

By Mr. Miller—I have it now the second year and in my planting this last spring I planted about twenty-four plants each, in twenty rows,

and I let those run so as to make a full row of each and I have now about thirty varieties, a row about seventy-five yards long of each. Among all these twenty-five or thirty varieties the Clyde is the most promising, quite large and productive, I can go in there and get a box of fine berries in a very short time; and the Ruby which has not been mentioned yet I expect to cultivate extensively next year. The Parker Earle with me is the berry, and if I can't grow ten thousand quarts to the acre I will quit growing berries. I have plants there that last year made quite a number of runners and a quart of berries to the plant. I want the early runners; I have known plants set out last fall have a handfull of berries on them, and plants that I could hardly cover with a half bushel, they have run out and made rows of runners and these are runners I am going to take; I use for fertilizer barnyard manure, hen manure and ashes.

By Mr. Gilbert—I have a few Clyde plants in bearing; they are not satisfactory with me at all.

—The Clyde is a perfect bloomer.

By Prof. Whitten—Among the seedling varieties there are at least 30 very promising ones, a number of them were selected several years ago and when only one parent from which they came was known.

There are two varieties at least which are doing much better than many where both parents were known. We have 180 varieties recommended throughout the State that we have tried side by side; now as to the seedling strawberries; two of the seedlings are considerably ahead of any that we could get hold of, and there are half dozen at least that are equally as good as many others. Some of them have not been tested enough as yet for us to say absolutely what they will prove; some have been sent out to prominent strawberry growers in the State who have promised to test them and send reports to us, and we hope to have an account at the winter meeting of how these berries do.

There is one point of interest in regard to those berries where both parents were known, and that is this: that out of several crosses that were made, the Crescent crossed with the Sharpless gave the largest percentage, by far, of good varieties. Out of about 80 plants crossed with the Sharpless there were very few that were not good; out of any other cross that were made it was the exception instead of the rule that any of them were very good; the Crescent crossed with the Sharpless was a very good cross indeed.

By Mr. Williams—About that Clyde berry spoken of a few minutes ago—while I do not wish to claim any notoriety or anything of that kind at all, I just wish to state my experience with a berry called the

Clyde. About eleven years ago I originated a berry on my place and named it after my youngest boy and called it the Clyde. I propagated and raised from that berry for three years and scattered it broadcast over the country under the name of the Clyde; after a few years I plowed it up and thought no more about it, for it did not prove successful with me, until within the last two or three years I have begun to hear a great deal about the Clyde; now if that is the Clyde that originated with me—I do not know whether it is or not—but if it is I will just say try it very sparingly at first anyway. It is a self fertilizer, the stem is rather coarse, and the berry is a little inclined itself to be coarse, looks as if you might have thrown a little sand over it; I do not know that this is the berry that originated with me, as it proved after so long a time worthless with me, but I know I scattered that berry over the country under the name of the Clyde, and whether some one has grown it and been successful, or whether it is another berry sprung up under the same name or not, I cannot say. That was some ten or eleven years ago, and it might do better with some of you than it did with me, but it did very well with me for three years.

By Mr. Barnes—I would like to know if anyone can tell me anything about a berry called the Bisel?

By Mr. Miller—I had the Bisel a few years ago and it did not come up to the mark and I let it run out.

By Mr. McKinney—I have the Bisel but it is not very good with me.

Mr. Gilbert—I had the Bisel and do not consider it of any good at all.

MARKETING THE STRAWBERRY.

In the fertile Ozark country, yea, in the great commonwealth of Missouri, the big red apple is not alone king. There is at least one other royal product and a princely aspirant for kingly honors. Into the lists has come a new knight, and his escutcheon bears the legend Warfield, Clyde, Crescent, Gandy.

He has come to stay and asks your good offices in his coronation, and your loyal support in the continuance of his reign. Long live king strawberry.

I am here today as his ambassador, his knight errant, his Sir Lancelot. It has been said by those weak-hearted, or possibly pessimistically inclined, that the strawberry would, ere long, be the subject of over-production, and some there are who have begun practicing the chanting of its requiem. Allow me to say that it is not in over-pro-

duction that the danger lies, but instead, in the crops unequal distribution. Your output properly and judiciously disseminated and your problem is solved and you will not have even a fractional remainder to leave on your vines or give to the birds. You are not raising a case, a box or a berry too many, but you have not as yet mastered the situation in regard to properly marketing this great product. It is pleasant, however, to note that you are assiduously studying how to remedy this grievous error, and in a little while, we hope in another season, you will be placing car lots with justice toward all and malice toward none, and reaping the reward your labor in developing the industry so richly deserves.

Do not glut or over-crowd any one market or any individual receiver. Give the house your association ships to as even a supply as possible and then see to it that he does not over-crowd himself by asking from your neighbors and getting in larger quantities than he can handle to advantage. The difficulty, as it does and has appeared, lies in the asking of too much and of the giving too bountifully.

Proper, just and equitable distribution should be your ambition. Not only in marketing your strawberries, but your peaches, apples and other fruit that you so largely consign as well. Co-operation in any industry prolongs its usefulness, regulates its supply and demand and ninety-nine times out of a hundred produces the best possible general result. You have realized its benefits in your home organization and have locally felt its beneficent influences. But you have not yet gotten all there is in it and you are just at the threshold of its relative worth, where, I am sorry to say, many of you are only too anxious to stop and go no farther. This is not wise nor is it courageous.

My idea is, that unity of action and oneness of purpose among the different associations between Van Buren and Springfield, Carthage and Monett will be the scalpel that will make the incision, find the trouble and remove the obstruction. It is more than a little difficult to say just how co-operation can be brought about to the best interests of all concerned, but weightier problems than this have been solved and this can be, surely. I will quote from a letter in my possession from a gentleman who has probably done as much towards making it possible to raise strawberries profitably as any in this great land of ours, he says: "I agree with you fully that the representative houses in the various markets can sell to advantage all the berries that are grown In Southwest Missouri and Northern Arkansas. The business has by no means gotten beyond the capacity of the legitimate receivers, but elements have crept in that are, we regret to say, most ruinous to producers and receivers alike, and must, in the end, if not remedied,

prove disastrous to all. The interests of both are identical in as far as getting as much out of the goods as is possible is concerned. The more the business can be concentrated, the better will be the results obtained, and the less friction there is caused by over-loading or shipping to irresponsible parties, simply because they have announced their market, and in well written letters asked for the business, the nearer will you all be satisfied with net results. Unbridled competition in all its phases at this end of the line and at the shipping point, too, raises more havoc in its serious results to all concerned in the fruit traffic than in any other on account of the perishable nature of the articles handled, and to realize satisfactory prices, it is altogether necessary to get as strong a hold on receipts as possible and have the entire co-operation of the shipper in the furtherance of that end.

There is no question but what complete and amicable co-operation is entirely possible, and at the meeting called in October to be held at Monett, you should push the matter to the extreme limit and obtain the desired end. I, myself, after having ten years' experience in this business, was almost persuaded to think that co-operation was not feasible or possible. But, having knowledge of the vast strides made this year towards such a consummation, I am led to believe that there is nothing in the future but what foreshadows good results. At Sarcxie and Van Buren as well, where large shipments were of daily occurrence, they have overcome the disposition that is inherent in us all, to take the best of everything for ourselves by first selecting from telegraphic market report the houses that they would ship to on a given day and place the names of these houses in a hat, would in another article of head-gear place the car numbers, and drawing first from one hat would announce the name of the house selected and from the other the number of the car to be consigned to that party. This system has absolutely done away with all favoritism or inclination of the shipping committee to place cars in which they had a large number of cases in any one market or to any one individual consignee. It has been often asserted that the shipping committee or the secretary of associations often billed out car-lots for pecuniary profit and personal aggrandizement. But with the new order of things this is almost an absolute impossibility. The same system of distribution might be within the pale of possibility, and, to my mind, should be quite so among the different shipping communities as well as it is locally. I would suggest that a committee of, say three, five or seven, be appointed from the large shipping centers, and during the shipping season have their headquarters at Monett—I say Monett because that is the center of the strawberry universe so far as Missouri and Arkan-

sas are concerned. All correspondence, telegraphic or otherwise, should go to this committee, a majority of them to decide by lot where the cars were to go. I believe that this would obviate the overcrowding of any one market, and there would not again in all time be a repetition of eight cars in Buffalo on a Monday morning and thirteen cars in Minneapolis on the same day. In Buffalo this was just twice too many and in Minneapolis almost like conditions existed. And how did this come about? Simply from the fact that almost every firm in the two cities named asked for berries in car lots from this immediate section, and I should judge from the receipts that their requests were most amply granted. The consequence was much more fatal to the grower than it was to the consignee, and the price in the two markets named and they, by the way, were not the only fleas on Fido's tail, and the prices obtained were fully fifty cents a case less than they would have been had this overcrowding not occurred. Had complete organization been in existence on the Friday on which these cars were shipped, Buffalo would probably had three cars and Minneapolis five, which would have in nowise glutted either market. As it was, some one, yea, many a one, were extremely fortunate if they got back what the crates and the picking cost them, not saying anything of legitimate profit, which you all should have.

J. W. WALLACE. Minneapolis, Minn.

By Mr. Tippin—May I have just about ten minutes, Mr. President, to reply to that paper? I assure you I shall appreciate this time. It fell to my lot to represent the growers of Southern Missouri in some of the Northern markets. I want to say that I heartily endorse the theory of co-operation outlined in the paper, and want to say that representative berry-growers have had this matter up while in the markets and have decided to take the matter up by correspondence, and I suppose that Mr. Carson, of the Hood river section, has already taken some active steps in this matter. And I want to say to you gentlemen about having representatives in the market, that the only way for you to know the condition of the market—to know who to ship your berries to—is to have some one there. I want to emphasize what the House in St. Paul said to me. They said: "I would rather pay you for your time and pay your expenses, if your own people do not feel able to send you and pay your expenses; I would rather pay it myself and have you on the market than to save that and not have you there." Now, in this matter of solicitation and allotment and all that, you cannot know who to send to and who the men are that

handle the berries right. The only way to do is to have a man on the market, and then he can tell you the situation of the market and can keep you posted, and he can make good deals, and he can afford to be earnest because you pay him his salary. When you trust to the men there, they will tell you they can make good deals; they will get a carload of berries when they ought to have only a hundred crates, and the only way for them to do then is to cut the price.

To my certain knowledge there are houses I have been in when I would be in the market, and to my certain knowledge they would not turn down a single car. There were houses receiving berries they had no use for on earth, and the only way they could sell was to cut the price, and how did they do it? They advertised the markets a week ahead all over Minnesota, Wisconsin and Colorado, and they advertised berries for \$1.50 when the markets were \$1.75. It is not right for the strawberry grower to have to pay for this, and the house that expects berries to go lower from day to day does not represent the interests of the strawberry grower. I have come back here with a grip full of information that I gathered quietly upon the streets and quietly upon the markets. I went down on the markets to buy strawberries commissioned out by certain men, and I only make statements that I have authority to prove, and, as I said before, when you solve the problem of growing berries you have not got half over the bridge, and believe me, gentlemen, you can never know who to ship to and know the condition of the markets without you have your representative men there, and for God's sake, gentlemen, always send him.

RASPBERRY CULTIVATION.

The following paper by D. A. Turner, of St. Joseph, in the absence of the writer, was read by Secretary Goodman at the State Horticultural meeting:

"I see you have me down for a paper on 'Raspberries—Planting, Cultivation, Pruning and Varieties.' They should be planted 8x4 feet apart. Plant as early in the spring as the ground will work well, or a good plan is to let plants get from five to eight inches high and you will be sure to have a stand.

"Cultivation should be thorough and shallow. I use a Planet, Jr., five-shovel plow and a two-horse cultivator and cultivate every eight or ten days from the time the plants are set to August 20, and hoe every other plowing. No weeds or grass should be allowed to grow.

"The first year pinch back when 16 to 20 inches high. It will make them more stocky and cause them to throw out laterals. The

second year pinch back two or three feet high. I never take out the old wood till spring, for it is a protection to the new canes. Shorten the lateral shoots from 10 to 18 inches in early spring.

"I have been growing raspberries for 20 years, and now place the Kansas at the head. It stands the winters better and resists anthracnose better than any variety I know of. It is nearly as large as the Gregg and much better in quality. It is second early and makes fine large tips and fine canes.

"The Progress is the best early variety here, fine and large fruit and makes better canes than the Palmer and does well on this sandy clay lands. The Queen of the West is a good berry, and makes the largest cane of any variety except the Schaffer. The red varieties I will say nothing about, for they have not been a success with me. I have a number of varieties now."

GATHERING, PACKING AND MARKETING SMALL FRUIT.

The most important part of the whole business of handling small fruit is in the packing. I am very particular about whom I employ. If a girl or boy applies, the first thing is to take an inventory of their personal appearance. If they look clean, neat and tidy, I consider their application. If their clothes are dirty and everything seems in disorder about them, I generally have all the help I need.

I believe I can go on the street and look at the passers by, and tell who would make good pickers.

Strawberries should be picked with a stem about one-half or three-fourths of an inch in length, either for home market or shipment. If possible, every berry should be picked separate and laid in the box. Of course we cannot have this done, but we cannot impress the fact too often on the pickers that they must be handled carefully. When the boxes are nearly full I have them turn the stem end down. This gives them a very attractive appearance. There is no fraud in this, the berries are no larger, but look so much nicer, and it pays to do it. My pickers, when they get used to this way, prefer it to the snap and scratch way. I pay my pickers $1\frac{1}{2}$ cents per box, and by so doing, I have a right to demand they shall be picked as I want them. I pay off my pickers every night, and this makes them feel good and eager for the fray next morning.

This brings us to crating up. Crates should be made out of nice clean timber, and don't spare the nails. For shipping I cover the berries with heavy tissue paper before nailing on the tops. For home

market, of course, this is not necessary. I do not know whether it would be best to use paper in shipping in refrigerator cars or not. In hauling berries to the home market, or for shipment, great care should be taken not to jostle them. A spring wagon with a careful driver should always be used.

The same manner can be practiced in handling raspberries and blackberries, except, of course they are picked without stems.

G. W. HOPKINS, Springfield, Mo.

DISCUSSION ON RASPBERRIES.

By Mr. Tippin—Some of us got the idea that it would be a good idea to put paper over the top of berry crates before the lid is nailed on; my experience has been that it is very disastrous. Mr. Peak sent up some 12 or 14 crates with heavy card board paper over them, and they were almost a total loss. Just before I came here there was a car-load of berries came in from Hood River, Oregon, grown by irrigation, and it of course was not a fair test as they had been delayed two days, but they all had paper over the top and the car was almost a total loss.

From my experience I could not advise, and I would admonish anyone, not to use paper over the top of the boxes; next year I think I will leave more ventilation on the top of the crate than I did this year.

Question: I would like to ask Mr. Hopkins how he pays his pickers for raspberries and blackberries?

By Mr. Hopkins—I used to pay two cents for raspberries; it is worth more to pick raspberries than strawberries; strawberries about a cent and a quarter, or a cent; I think a cent is a very fair price. I believe at a cent a man can make good wages, for he ought to be able to pick a hundred quarts a day, and that would be a dollar a day.

By Mr. Mosely—I believe that a cent a quart throughout the season will make very good wages. In first starting I have paid a cent and a quarter, and it would be rather poor wages made at that in consequence of the berries being thin, and I used to say something like this: if you will stay with us through the season and pick berries when there are berries to pick, you can make good wages; otherwise, if you do not intend to stop but a short time it will hardly pay you to pick berries today as you can't make very good wages at the price we are paying. Now at a cent a quart in the height of the season when berries are at their fullest, rather a slight woman has made as high as \$1.24,

and averaged as high as a dollar for blackberries; strawberries were picked at the same price, that is, a cent a quart; raspberries are usually a cent and a-quarter to start on and a quarter of a cent higher at the end of the season. I do not board the pickers.

By Mr. Barnes—I used to think I would formulate a plan by which I would offer premiums; in other words, I found we had pickers who would stay with us and take the cream of the picking and then fall out and leave the work to the inferior pickers, and with peas and beans as well as berries, and I have often thought I would formulate a plan by which I would pay a reasonable price and then would attach a premium or additional price for those who stayed with us and did their work right. I believe it would be a good idea. In practical work it might fail because you know the class of people who pick, from the little folks who do not know anything about and are not concerned in financial matters only as concerns themselves, up to those who understand such matters, but it seems to me it is an idea that would be beneficial to growers of such stuff as must be picked by hand.

By Mr. Hopkins—It is a very evident fact that at the beginning of a strawberry season when you have large berries that pickers can make good money at a cent a box, but on the wind up it requires a great deal of laborious work to make anything at that price. I pay a cent and a half from beginning to end, and I want to say that after twenty-six years of growing berries I have not had a picker to leave me, not a single one, and sometimes when picking is very hard, I sometimes pay two cents, although I am not getting any more. And I want to say, I have tony pickers. I have had some come to me and offer to pick for a season at a cent a box, but I wouldn't turn off my old pickers if they would pick for nothing, and I am going to pay a price that will justify me in getting good help, and I want to say that I get my pickers from among the young men and the young women who are graduates of the High school and who are educated. I don't have any of your trashy pickers, and I find it pays in the end to pay a price that will get good help.

By Mr. Gilbert—I am not so liberal as our Kansas friend. I have adopted a system of paying for berries whereby, if the picker does poor work and gets fired, or gets tired when it gets hot, he receives a discount, not a premium. We use these basket carriers, and I have adopted a system of punching cards. It is one I got up myself: take an ordinary shipping tag and make an addition of six for the six boxes and an addition of nine on pink or cardinal colored cards. The addition of nine means a cent and a half a box. If you want to pay a cent and a

half a box, you punch the card every time a carrier is brought in; if you want to pay a cent a box, I use manilla cards—take a manilla card. This year we made it a rule that if our pickers would stay with us as long as we wanted them, we would pay a cent and a quarter a box, provided our berries netted us less than \$1.75 a crate; if more than \$1.75, we paid a cent and a half, and if they got tired or fired they got a cent a box.

On a shipping tag you can get five rows of figures from the top to the bottom of the card, making an addition of six on one card and nine on the other, and still have room on the right hand of the card for additions of 1, 2 and 3 for odd boxes; during the season, if a picker wants a dollar or two, the cards will show whether there is that much due him, and if he has picked that many boxes, we give it to him and punch in the center of the card the number of even dollars.

By adopting this plan we have had less trouble than we ever had before, and there is no book-keeping about it, the accounts are always footed up, and it is very much less trouble than any system I have ever tried. I intend to get an electrotype of the form so I can print the cards very cheaply.

By Mr. Zink—I have tried to reduce this matter of picking to a system, and while I may not have it down to a system yet, I at least have it on a much better plan. I have my pickers numbered from 1 up to as many as I have and I have my handies numbered, and then I have a man mark the boxes as they come in with the number of the person, and when a person comes in, for instance it is 23, I will have him turn the box over and mark it 23, and no matter whether it is a half day or half hour I can go to any box that is there and tell just who picked it, and if there is any better way of detecting any fraud I want to know it.

Question: Do you mean to say you have each box of berries emptied out and the box marked and the berries put back in?

No, sir; I have my man just hold the box up this way and mark the number right on the bottom and I can go there and lift the box and look under there and see just who picked it.

Mr. Gilbert—I would like to call attention to the Babbit raspberry I am growing; it is very productive and one of the best shippers that I know of. They will arrive in good shape at their destination over almost any distance you want to send them.

Mr. Murray—I am with Mr. Gilbert; I think that is an Iowa berry; it makes a good grower in Iowa; it has proved more productive than the Hopkins and one that will sell better. I saw them in Iowa side by side, the treatment was identical, and I wouldn't be positive about the

yield, but on the bush the Babbit was much larger, is hardy and a fine grower. I have the Babbit, the Kansas, Gregg, Hopkins, Winona and one or two new varieties, and I have received from our worthy President a few plants; that I won't try to tell you about yet; I can say though that it is very promising and very good, but I don't know whether it will turn out four or five times better than anything else or not, but I hope it will but of the varieties I have spoken of the Kansas is certainly one of the best, it is a fine grower and a good berry.

I have it and have others, but have not tested these different varieties side by side in late years, therefore, will not speak at length. I believe we are inclined to overlook the raspberry; to get interested in one berry and overlook another. In our part of the State there are not many raspberries and I think they could be grown with some profit. I grow only the black caps now.

By Mr. Gilbert—I would like to say of the Babbit, I do not consider it a berry of good quality; in Southern Missouri we want something we can ship that will arrive at its destination in good condition; in Northern Missouri, Southwest Iowa, Eastern Kansas and Nebraska, where they have plenty of blue grass and sugar and cream they are fine, but for the reason they are good shippers I like them better than any I know of; they are of good size, but not very good quality, but with plenty of sugar and cream they are very nice.

By Mr. Barnes—I would like some one to give us some practical information about raspberries and blackberries; I would like to know the different methods of picking the raspberries and blackberries. With strawberries you are right down with the berries and can get to them very easily, but with raspberries and blackberries it is different, and I would like to know the best method.

By Mr. Hopkins—I have always used what is called a half-bushel basket; if the vines are full they set them down and they can sometimes fill a box or two without moving the basket; as to going along and picking a single box, I would not hear to that at all; raspberries require to be picked just as carefully as strawberries.

By Mr. Van Houten—When I used to gather berries I had a little crate made that held two boxes and I had that fastened by a string around my neck and a string around my waist, and all things considered I found that the most satisfactory and the best pickers I had invariably used them. I found that women made the best pickers.

Mr. Everington—I have a number of the Kansas here on my place near Springfield and they seem to do very well; it is a large berry and ripens its fruit most all at once, and with me it has done better than any raspberry I ever used. The Kansas, and some of the same kind,

are to my notion the coming berry. For a marketing berry, it would not market so well as those Mr. Gilbert spoke of, it is a softer berry. It is very productive, and I think the Kansas is the coming berry, so far as my experience goes.

Mr. Hopkins—I have set out a few of the Kansas, and my objection, just as the other gentleman said, it ripens its fruit all at once. The berry is all right I suppose.

Mr. Atwood—I want to say a word for the Progress. I visited at Seligman H. C. Fitch, who is a large berry grower and has about 20 acres of raspberries, and he says the best growers are the Kansas and the Progress, but the Progress is ahead of the Kansas, and another thing in its favor, the season for it is longer, and the Kansas ripens quickly and we will have a glut in the market; the Progress will stay in the market twice as long. They commence to ripen about the same time as the Kansas but last much longer.

Mr. Smith also recommends the Gibson very highly.

Mr. Murray—It rather strikes me that berries that ripen all at once can be picked cheaper than berries that ripen longer. There might be a glut in the local market, but when it comes to shipping I do not think it would make any difference. We might have a number of different varieties, starting in with the Babbit and then the Kansas and others and have them ripen long after each other, but I do not think a berry ought to be discarded because it ripens its fruit all at once, that is, within a week or ten days.

Mr. Hopkins—I do not say discard it at all, but I think it would be bad policy to everybody to go in and plant the Kansas.

At the close of this session President Jesse was introduced and the meeting adjourned until the afternoon.

WEDNESDAY, JUNE 9--2 p. m.

The session was called to order by the President.

The following letter was read:

SARCOXIE, MO., June 7, 1897.

Mr. G. A. Atwood, Secretary Greene County Fruit Growers' Association, Springfield, Mo.:

We today express prepaid to your address one bale of peach and plum trees for distribution and trial; trees kept in our storage building since last November. Hand them to some one that will take care of same and likely report success or failure of same to grow.

The packages will be in 3 trees of a kind—peach and plum. Let them go as you think best.

One of us will try to be at the meeting however. Our James B. is yet fast on the shipping committee. They expect to get 3 cars of berries out today, mostly Gandy.

We have had several fine rains in the past few days, which is causing all transplanted stock to start to growing nicely.

Yours truly,

JAMES B. WILD & BROS.

Mr. Mosley was appointed to take charge of the distribution of these trees, and reported as follows:

Mr. Nelson, Lebanon, Mo.—Three Botan, 3 Flaters St. John.

Snodgrass & Moore, West Plains, Mo.—Three Botan, 3 Flaters St. John, 3 Hytenkio.

S. B. Mortiman, Springfield, Mo.—One Old Mixon Free, 1 Stump.

D. T. Ferbrache, Springfield, Mo.—One Botan.

Geo. Williams, Humansville, Mo.—Three Stump.

J. B. Jones, Peirce City, Mo.—Three Flaters St. John.

W. H. Parks, Springfield, Mo.—One Botan, 1 Old Mixon Free, 1 Stump.

O. F. Co. & S. W. Gilbert, Olden, Mo.—Three Hytenkio, 3 Sappington No. 1.

F. C. Myer, Springfield, Mo.—Three Sappington No. 1.

W. H. Vaughan, Springfield, Mo.—Three Flaters St. John.

W. T. Zink, Springfield, Mo.—One Old Mixon Free, 1 Stump, 2 Botan, 1 Flaters St. John.

J. M. Blockman, Springfield, Mo.—Three Old Mixon Free.

J. T. Fulbright, Springfield, Mo.—One Old Mixon Free, 1 Stump.

G. C. Hughes, Exeter, Mo.—Three Sappington No. 1, 3 Stump.

Mrs. R. C. Mayer, Mt. Grove, Mo.—Three Botan.

Fred Marshall, Springfield, Mo.—One Stump, 1 Old Mixon Free.

Ed. Davis, Springfield, Mo.—Six Wild Goose.

Theo. Bamster, Springfield, Mo.—Three Wild Goose.

O. H. Michell, Springfield, Mo.—Two Flaters St. John, 1 Botan.

B. F. Fielder, Springfield, Mo.—Three Wild Goose.

W. H. Parks, Springfield, Mo.—One Botan, 1 Old Mixon Free.

S. S. Tracy, Springfield, Mo.—One Botan, 1 Old Mixon Free, 1 Stump.

Reports of trees previously given were called for.

Cold storage trees from Wild Bros.—One year ago I received two Japanese plums and two peach trees, planted on my return from meeting. Trees all lived and made light growth last year. This year they are making a good growth and doing fairly well. GILBERT.

Planted one Elberta peach and one Apricot tree from cold storage. Received the trees at horticultural meeting at Willow Springs. Planted in June, and trees have grown and are now large and very thrifty. S. KAUFMAN.

The meeting was opened to a discussion on blackberries.

DISCUSSION OF BLACKBERRIES.

Mr. W. H. Vaughan—I have been cultivating the Early Harvest for ten or twelve years and find no rust on it.

I have a new berry I want to introduce to the Society. This is an early berry; ripens about a week earlier than the Early Harvest; ripens early like the Kansas. This is a new berry I found in a row of Early Harvest and I set them out and cultivated them, and have a long row of them now. Do not know whether they are something new or not. They are a week earlier than the Early Harvest and about a third larger, and I have never seen any appearance of rust during five years that I have tried them. The Kittatinny and Lawton and other varieties I have tried all rust. The Erie I got and set out a big patch in the spring and plowed it up in the fall; every plant in the field had rust on it, nearly. This new berry does not rust.

Q. What is the character of the new berry when it is ripe?

A. It is firm enough to ship well; it is not so firm as the Early Harvest, it is the firmest berry we have, but this is a good firm berry; I had several crates of it last season here in market.

I have the Taylor, Taylor Prolific it is called, the Stone's Hardy, Erie, Minnewaski and one from Mr. Wiley. The Taylor is a very good berry; now at this time the Minnewaski and Erie are my choice. I do not think that the Erie can be beat in any way.

Mr. Zink—I have the Taylor, Knox, Early Harvest and the Maxwell and the only rust I found in them was in the Early Harvest; I got about a dozen stalks of rust in the Early Harvest. The Maxwell is the most prolific berry I ever saw in my life; it is a large berry, sweet and of good flavor, but I am afraid it is too soft for shipment. It is somewhat on the order of the dewberry, has a spreading bush, does not grow upright, but I look for something grand from the Maxwell berry.

Mr. Moseley—I would like to ask the Association for a preventative or remedy for the blackberry rust.

Prof. Steadman—The Bordeaux mixture is the remedy that is used in 99 cases out of a hundred, applied just as soon as you see the first indications of rust; it is not a curative but a preventative.

Mr. Gilbert—I am growing a few of the Snyder, Taylor and Early Harvest. I have found five or six stalks of rust in the Early Harvest, but none in the others. The most important question with me is after getting the fruit how to get the money out of it.

——— Out of ten years' experience in growing Early Harvest, Taylor and Snyder blackberries, I must say I have never seen any rust in either at my place, with ten years' experience in growing.

The cultivation has been quite light. I have never had any occasion to mulch with anything. My cultivations have been, of course, to clean out the old canes, remove them, and at the proper time to pinch off the top, and in the spring, just before the buds are starting out, to take my shears and shear the entire patch, shearing each variety about equal, however, clipping the Early Harvest a little shorter than the others, on account of the fruit being so heavy, and I have never seen a bit of rust among the varieties, and the cultivation is plowing one time; as a matter of course I spade up the entire ground, except the canes I leave, and one plowing is all the cultivation they get during the year. The Early Harvest has the lead in the plants that will be there; it has about twice as many spoken for as the others and the plants are now ordered with a special charge for me to keep them for them. The Early Harvest is a special favorite with those who see them. My place is not very stony, on a reasonable height, where the water does not stand, and I don't think any family in Howell county can very well afford to be without all three of those varieties. I particularly favor the Early Harvest for home use, for the fact it is about 30 days from the first picking until the last one is gone.

By Mr. Williams—In using root cuttings, which we do frequently at my place at least, do you think the roots of plants that have rust are any more apt to take the rust than those taken from plants that never have the rust?

Mr. —As to the Early Harvest it is a native of Missouri, and first found its way into J. T. Lovett's hands and he introduced it, if I remember rightly; somehow or another he got it into his hands and then introduced it to the public.

Now as to rust: I had some vines that were pretty badly rusted; I intended to take them out and throw them away, but just neglected to do it, and this spring just as they were beginning to leave out, I sprayed them thoroughly. Last year they rusted so that the leaves fell off; and when the leaves were about half grown, I sprayed them again. So I think by spraying in time, just as the leaves begin to appear you can keep rid of the rust. The spray I used was composed of the ordinary Bordeaux mixture.

—As to using cuttings affected by the rust, they are more liable to rust than from plants that are not affected by the rust.

Q. Give us the reason why you think they are more apt to rust? Where does the rust originate on the plant?

A. That has been a mystery to me, from the fact that I have noticed when sprouts were coming up out of the ground they were

somewhat infested with the rust as they came up, and whether it is in the roots or in the plant, I do not know, however, this spraying will prevent it. It will prevent it except in new sprouts springing up from the roots. As to variety, I have grown all the varieties mentioned, and I have grown what is called the Salzer Early blackberry; it is by far the most delicious berry I have had; it spreads over somewhat like red cap raspberry or the dewberry, and is very fine.

Mr. Goodman—Under no condition would I buy from a nurseryman who had plants infested with the rust. You cannot injure the leaves or the top of a plant without injuring the roots, consequently you ought never, under any circumstance, to grow plants from root cuttings infested with the rust. My experience has been that the Kittatinay is more susceptible to the rust than any of them.

President Evans—This subject of blackberry rust is like pear blight, the more we say about it the less we know about it; I had some berries that had the rust and took them out and threw them away and a man came along and took some of them, and I advised him to leave them alone, but he planted them and had fine berries. And that is the way it goes, you cannot tell anything about it.

Mr. Van Houten—In reference to pear blight, I think the close observer will notice that the blight appears on the new succulent growth and from my investigation I came to the conclusion that whatever caused the rust continued there at the surface of the ground among the leaves, or in some way in the ground. I think that plants taken from where there had been rust, although the roots themselves might not be affected, there would be that possibility, even the probability of the germ of that disease, so I wouldn't plant anything from rusted plants, and I believe that rust is propagated in that way and I do not think it would be well to take roots from a rusted patch; in my experience I have never known of plants being taken from a rusted patch, but where the rust again appeared. I believe the Bordeaux mixture if used will cure it. Extermination, in my judgment, is the only sound way when rust gets started, and then be sure and propagate from plants that have not been rusted.

Mr. Evans—I want to say that in speaking of pear blight, a privilege has been accorded to Mr. Van Houten that has not been granted to any other member of this Society for 20 years.

——As this is an experience meeting I want to state my experience with blackberry rust. I cultivate the Snyder, I think they are about the best berry we have; in the catalogue they are listed nine points for deliciousness. I had about an acre and a half and I had picked them for several years and they commenced to rust and in the

first place, there was a small patch of them rusted and the third year probably one-third of the patch was rusted; I took from that patch and set another patch just across a little piece of meadow, not more than a few rods from them, and there is no appearance of rust in them.

My preference would be to take berries from a sound patch, but as I have stated, there is no appearance of rust in my patch; my berries are healthy and fine from the start to the present, and my opinion is that it is confined more to the leaves than to the roots. We took them from a patch where there was rust and got a sound patch from it.

Prof. Whitten—Blackberry rust has been investigated considerably of late years by microscopic experiments, and it has been found that by far the greater number of cases that the spores fall to the ground and affect the lower part first as micelium. You would not know that rust was in that plant until the micelium had commenced on the lower part of the plant, and then after the plant has got more fully grown, the spores, or what corresponded to the seed, began to show on the plant. Now, you may take a part of that plant infested by the rust and you may grow a perfect plant from that, but that is a dangerous thing to do, because the micelium does circulate on the underground part of the plant, and you might get a root without the rust, yet on the other hand you might get it with the rust.

Q. By Mr. Snodgrass: I would like to ask how this rust operates.

A. It is commonly known that the red spores that we see on the leaves which begin to fall off after those red blotches begin to come, and that is what corresponds to the seed, those red spores, will germinate under favorable circumstances. More frequently it washes down into the lower part and spreads under the ground, and it grows there in the shape of what is called micelium during the winter and in the spring it begins to come up, when it comes up and begins to shed spores or seeds by means of those red blotches, and in that way is spread.

Q. How does the Bordeaux mixture reach them and kill them?

A. Those spores may gather around other of the spores and still be invisible to you; but shake some of them off on a glass and put it under a microscope and you will see millions of them when there will be very few you can see on the glass. It is not known how long those spores will live; they may live there all winter, but we are not sure; but wherever the Bordeaux mixture strikes them it will kill them.

Q. Then it follows that if the disease got into the root there would be no cure for it?

A. It would not kill the disease that was in the roots, but it would prevent that from spreading out into another crop of spores;

if you will kill the spores, kill the micelium in the old plants, and they will gradually disappear. What micelium is in the young sprouts now will be taken away when you trim after harvest; then if you keep the spores away, the micelium will gradually disappear.

THE KITTATINNY BLACKBERRY.

The paper assigned to me by our worthy Secretary for this meeting will enable me to answer letters of inquiries asking what is the largest and has the longest period of ripening.

The Kittatinny blackberry is the largest, has the longest period of ripening that I know of, and there is no better market berry. It is very productive, but I would not advise planting a large acreage in soil where blackberries are subject to rust, as the Kittatinny is subject to rust as much, or more, than any other variety in cultivation.

In answer to the question: Will it pay to plant wild blackberries? Yes and no. It pays to set wild blackberries rather than to do without them; but it pays much better to plant the cultivated varieties. I have dug up the largest wild ones that I could find; selected them at time of ripening, marked them to be dug up for planting, but failed to find them, when cultivated, up to our best tame varieties. One little patch in which we dug the plants from the woods eighteen years ago, were cultivated about four years. When we found them in the forest the canes were as large as the largest Kittatinny, and berries in size between Snyder and Kittatinny. I thought that we had found a berry to take the place of the Kittatinny, as it was said wild blackberries were free from rust.

True, they have shown no sign of rust, have borne sixteen crops, berries the size of Snyder, but not as productive; and others proved about the same. The same, I find, holds good with raspberries. When we find these big berries we generally find them growing in rich fence corners or where old apple-tree tops, leaves and wood have rotted for years and made the ground rich with natural fertilizers, and a new coat of leaves added every year to hold the moisture in the ground. This is one reason so many fruit-growers get deceived when they see these blackberries grow wild. They don't think of the favorable spots where they grow. They dig them up, set them out, pot-feed them like a fifty-dollar pig or calf, and get deceived themselves, and unintentionally deceive those they sell these new berry plants to. I will close by saying: Plant the Kittatinny blackberries, care for them, and you will have large fine berries.

JACOB FAITH.

GLASGOW, Mo., June 7, 1897.

Members of the Mo. S. H. S.—I regret that I cannot be with you, as we are in the midst of the largest and finest strawberry crop we ever seen or grew. And I send you a few specimens for exhibition—not to compete for premiums—but to show the people what Glasgow strawberries are like. If it were a week earlier I should have sent you specimens of 35 or 40 varieties, but the earlier ones are running very small now and we could not do them justice.

We have picked up to eve of June 7, 800 cases of 24 quarts each from about 4 acres, and with another rain will get 300 to 400 more. I mention this so that if there is any one attending the meeting looking for a location to grow fruit, and especially berries, say to them to come to Glasgow, the garden spot of Missouri.

I have been too busy to write you a paper on blackberries as per program, but you will get it in time to get it in the report, and I will just say now, plant Snyder 1x8 feet, cultivate thorough and often, manure freely and you will always have plenty of blackberries. There may be better and more profitable ones than Snyder, but Snyder is good enough for me. We expect to get 5,000 quarts per acre this year.

Wishing all a pleasant time, which I know you are going to have, I am

Faternally yours,

HENRY SCHNELL.

GRAPES, OLD AND NEW.

I am pleased to have the above subject assigned to me, because I wish to draw the attention of our fruit-growers to this subject in earnest. Why is it that Missouri, where this fruit can be grown to such perfection, will admit cars, in fact, train-loads, of grapes to be brought into our State from Ohio and New York, and be sold at a profit? There is something wrong in this.

Some years ago the rot seemed to discourage our grape-growers, so that acres and acres were dug up and destroyed, partly on account of the rot and partly on account of the low price they got for their grapes.

Now, since the spraying with the Bordeaux mixture will prevent the rot and keep the foliage healthy, we certainly can compete with our Ohio and New York friends. We have suitable lands here for the purpose, and labor is as cheap as in those other states. Besides this, the land on which they grow their grapes is valued much higher than ours.

THE OLD VARIETIES.

How far shall I go back for these? Sixty-five years, when only a few of the American varieties were in existence, and only a few really worth growing.

The advent of the Isabella and Catawba were a great step in advance, and are not to be despised at this day, as both are excellent table grapes, and the latter among the best for a white wine. Next came the Concord, which one might say revolutionized the grape culture, and this is today the most popular one in the states east of the Rocky Mountains.

Next came Rogers' Hybrids, a number of which are grown by most grape growers now, yet Goethe, Massasoitt, Lindley, Wilder, Merrimack and Barry are the most popular. I was the first man in Pennsylvania to fruit the Concord, and also a number of Rogers' Hybrids, the originators kindly sending me a start of them before they were offered to the public. Rickets' Hybrids made another advance, and among which are some of the finest grapes grown in this State.

Empire State, Jefferson, Lady Washington, Secretary, Excelsior are among the most prominent. Geo. U. Campbell, of Delaware, Ohio, sent out a number of valuable ones. The Triumph, which, with his consent I named, is, in my opinion, the best white grape for table that we have, but is not quite hardy in our severest winters. Underhill's Irving (white), Black Eagle and Defiance are superb black ones which he allowed me to name. The Norton is also going back pretty far, and it has no equal as a red wine grape except in the Cynthiana, which some claim to be the same grape, but is singular, if so, when one originated near Richmond, Va., and the other in Texas, somewhere on the Red river.

Jacob Moore, of Ithaca, N. Y., produced the Diamond, as good a hardy white grape as we now have. Herman Jaeger, of Neosho, produced a number. The late John Burr, of Leavenworth, Kan., gave us quite a number of excellent varieties, and T. H. Munson, of Denison, Tex., has perhaps surpassed them all in his excellent seedlings. I cannot name all these varieties, but any one can get their catalogues that desire them.

To comment on some of these new ones I will state that I consider Burr's Early Victor the best early black grape we have. Early Ohio is another valuable one. Moore's Early is a large berry, but not large in bunch, and with me is not productive as is desirable.

But I am not done with the valuable seedlings. My friend across the river here, Jack Russell, has added quite a number of valuable ones, many of which were never brought before the public. Woodroff's Red is among the most valuable of the red ones—bunch and berry large, very showy and of good quality.

And now we have Campbell's Early that from all I can learn, is going to fill the bill. It is growing finely here to the tune of \$2 per vine. Am promised a basket of the fruit when ripe, after which I can give an opinion of it. Then McPike, of Alton, Ill., has a seedling of the Norton which is a marvel of size and beauty, but which is not yet for sale. Some fifteen years ago the Department of Agriculture at Washington sent out a number of Haskell's seedlings of which I received about one dozen varieties. Of these some were wild rampant grow-

ers, but bore no fruit; some died; others lingered along and never made wood strong enough to bear fruit, but a few have survived and are now showing well. One in particular is a most vigorous grower and profuse bearer of bunches and berry above medium and of a quality to my taste excelled by none. As they had no names, but went by numbers, I named this one Ruby, on account of its color.

And last, but by no means least, I come to the Columbian Imperial, whose picture almost startles one. I went in on this pretty heavy, having confidence in the testimonials. Sold a few to others, but planted about \$15 worth of the vines myself. Last season I was disappointed with it, but this year it promises better, but by no means up to my expectations. The restrictions may be taken off some, when it will be more extensively tried. Men don't like to pay \$2.50 for a vine and pledge themselves not to propagate, sell or give away any wood. The trimmings of my ten vines that I threw away would be worth \$100, according to the usual price of wood, with that of a vine of the same sort. The berries on the small bunches I had last year were the largest I ever saw of any native grape, except the old Charter Oak, which was utterly worthless.

As to a general description of all these grapes, there is no need of giving. It would take up too much space. It is not easy to say which rots the most, for with a very few exceptions, all grapes rot more or less, unless sprayed or sacked.

Up to this time the prospect for a full crop of this excellent fruit is very promising. No insects have as yet done any damage, and the vines are in good health.

As mentioned in the beginning of this article, will again ask whether we cannot grow all the grapes here that we need? We have varieties good enough for any one, and might do without the Californians, were it not that far-fetched and dearly bought has a charm for some people. I am fond of good things myself, but have never bought one dollar's worth of California grapes. But their oranges (which we cannot raise) I like to pay for.

I rented an acre of Norton Virginia from a neighbor that shows a full setting, but in the pinching back I took off at least 30 per cent of the blossom bunches. Expect to have as much weight of fruit as if all had been left on.

SAMUEL MILLER, Bluffton, Mo.

GRAPES IN SOUTH MISSOURI.

Mr. President, Ladies and Gentlemen—When our worthy Secretary requested a paper from me, I declined stating that I was too busy. He replied that he could not take no for an answer, and enclosed a programme with my subject allotted me, "Grapes in South Missouri." I stand before you, not as an experienced horticulturalist or writer, but only a plain every day business man, having been interested in horticulture a little less than four years. I came from Chicago to West Plains the summer of 1893, buying an interest in the West Plains Fruit Co., and assuming the management of same. There was at that time a small vineyard of about 200 vines on the place 6 or 7 years old; they had at one time run upon two wires, but the posts had rotted off and wires and vines one net work, with weeds higher than my head; not enough grapes matured that season to tell their variety. The following winter I cleared away the old trellis and cut most of the vines to the ground, leaving enough for the youngest wood, to try and find out the following season the varieties we had. I then staked them, fertilized the ground thoroughly, and plowed them well early in the spring. I took special care of those grapes, and the summer of '94 satisfied me that grapes in South Missouri was one of the fruits to grow. We gathered from many of those vines we had pruned so severely in the winter, 30 pounds of fine luscious grapes, Concord, Goethe, Delaware, Clinton and Niagara.

The same spring I decided to put out quite a vineyard, so corresponded with Mr. Meissner of the firm of Bush & Son and Meissner, of Bushberg, Mo. He paid us a visit and located our vineyard. Not knowing what I wanted I left it entirely with him as to varieties. We have about 15,000 of what is classed as "Market or Table" grapes, 8,000 strictly wine grapes. I will speak of the varieties later. Will now describe my grounds and how planted; my experience may help others and prevent the mistakes I made. Our vineyards (of 36 acres) are located on quite an elevation, sloping to the west, north and east, the principal slope being to the east. Many of you no doubt know the kind of soil we have about West Plains, providing you have taken a pick or mattock and dug through the loose rock to find it. It is a strong, deep red soil, heavily impregnated with oxide of iron, silicates of potash and soda, carbonates of lime and potash and other chemicals very conducive to root growth. The broken rock which covers the surface of a great portion of our Ozark fruit region is a crystal-

ized limestone; this is nature's own fertilizer, they not only hold the heat and moisture, but by the constant disintegration of these rocks gives us a fertilizer not to be found elsewhere, and with perfect atmospheric conditions we have a soil and climate specially adapted to the grape.

This ground was covered with a second growth of black jack, post and white oaks, hickorys, etc. We cleared this off, cutting stumps very low, and plowed it thoroughly with what is known as a "Bull-tongue" plow. Cross-plowing with same, this cleared it pretty well of roots, and left most of the loose rock on the surface, where we wish to keep them. We then laid off the ground, making our rows 8 feet apart each way. Permit me to state right here, were I to increase my acreage, I would not set closer than 10 by 10 feet, and if to be kept on the stake system, even further apart. Our vines, as they are now set, crowd us, and with difficulty we can drive through with wagon to replace and straighten up posts. We bought one and two-year-old vines, the best to be had. I had a force of men digging the holes one foot deep and eighteen inches square, another set of picked men following setting out the grapes, one carrying the vines, spreading the roots carefully in the hole, the other filling in the fresh earth, being careful to get as few rocks on or near the roots as possible. Of the 20,000 put out in March, we did not lose a half of one per cent. We gave them thorough cultivation all through the season, allowing them to run at will on the ground, knowing a good leaf growth meant a corresponding root growth. Many of those vines made a growth the first season of 16 to 18 feet. Early the next spring we pruned to two buds, selecting the strongest and best. During the winter we had cut, barked, sharpened and driven over 20,000 stakes while the ground was soft. We make our stakes seven and one-half feet long and about the size of a good fence stake, mostly post oak. These we drive one and one-half feet in the ground, near the vine, in perfectly straight rows. We then tied the young shoots as they came to the stake, pinching back and thinning, removing all new growth from about the roots.

Thorough cultivation and constant tilling gave us a marvelous growth. The next spring, or second year from time of planting, we pruned the two canes to about four and a half feet in height, cutting all laterals to one and two buds. We found from experience the season before that it would need something stronger than binding twine to hold them to the stake. We wound the two canes in opposite directions around the stake and fastened them by driving a barbed wire staple just below the last joint to the stake, not enough to kill the

vine, but keep life and growth enough to hold it firm. The bud below takes the lead, and when to top of stake, is there tied to it, and pinched back. We had a fine crop of grapes last season, over ten tons shipped from these twelve thousand two-year-old vines. In February and March of this year we again pruned quite severely, leaving the vine at top of stake 6 feet and leaving spurs of one and two buds, again stapeling them to top of stake. They are now loaded with large, well-formed bunches. I am giving them thorough cultivation, using the double shovel plow, and a very systematic thinning and pinching back. I have a force at the present time of fifteen women and girls, none under fifteen, at work, one man having general supervision. We find women and girls do the work quicker and better than the average man.

Now, as to varieties. We have some twenty-five varieties of the table grapes, many sent us to test. Our principal varieties are Moore's Earle, Worden, Concord, Pocklington, Delaware and Niagara. Some of the other varieties are Early Ohio, Goethe, Brilliant, Hasford, Green Mountain Vergennes, Moore's Diamond, Martha, Lindley, Lady Washington, Jefferson, Francis B. Hayes, Elvira, Eaton, Cottage, Clinton, Brighton. These are all classed as table or market grapes, yet many of them will make a delicious wine. Were I to set another commercial vineyard, and judging from my observation and experience of last year, I would put out ninety-nine per cent of Moore's Early, and if undecided what other variety for the one per cent, think would put out Moore's Early. Not that they are better than many other varieties, but because they are the earliest and consequently we get better prices. We shipped our first grapes July 15 last year, fully two weeks ahead of the Concord.

For a small vineyard I would select the following: Moore's Early, Warden, Pocklington, Niagara, Brilliant and Goethe. For wine grapes we have Norton's Virginia and Cyuthiana for red wine, Herbemont and Cunningham for white wine. From the 8,000 of these four varieties we sold last season over 11 tons of grapes. Our handling of these vines are about the same as the table grapes; they are very vigorous growers and require more pinching back and thinning. If we had less rock think would put all our grapes on three wires, adopting the Knifsen system as near as possible, but the expense of cultivation where you cannot plow both ways would be very tedious and heavy. When these stakes are gone I may put them on a high trellis, as we prefer that method. You can spread your vines, getting more sunlight and circulation, besides plow both ways. So far we have been troubled but little by black-rot. The only variety effected to any extent was the Herbemont. We tried spraying with the regular Bordeaux mix-

ture, but found it entirely too strong. We then weakened it, using six pounds copper sulphate, six pounds quick lime, two ounces Paris green, to 70 gallons water; even this was too strong for the Herbemont foliage, so we gave it up; and yet we had a third of a crop, but bunches were so irregular they did not look well. We fear the same trouble this year; will give them another trial and if with no better result will dig them up and replace with Cunningham, a delightful wine grape. So far we see no signs of rot on any other variety and until I do will spend my time in cultivating and pinching back, getting all light and circulation about the vine possible. This is my experience with grapes in South Missouri up to date. A word further regarding the average and I am through. In 1893 there were but three commercial vineyards of a few hundred vines each, now there are hundreds and hundreds of thousands of vines planted, the acreage increasing rapidly each year. Up to last year there were but few grapes shipped; I doubt if the commission merchants here ever receive a consignment from all that territory. This year we will ship by car-loads, besides there was built a very large wine cellar at Brandsville last year, this company taking all the good wine grapes grown. I predict that the grape culture will grow rapidly and before many years our rocky hillsides will be covered with vineyards and the wine industry second to none in this country, for those claiming to be experts and are posted say our grapes make a wine equal to the best brands of the old country, and our table grapes cannot be surpassed by any locality in the United States.

JOHN T. SNODGRASS, West Plains, Mo.

PLANTING, CARE AND PRUNING OF GRAPES.

SOIL AND LOCATION.

The grape prefers well-drained soil and free access to air and sun. Hence elevated sites are best, but when the above named requirements are afforded they can be successfully grown in any situation. A sandy or loamy soil is best, but with good care they will grow in any except wet soil.

PLANTING.

On level land, rows running north and south are preferable, as giving best aeration, but if planted on a slope, the direction of the rows must be adapted to that. I have found the best distance for planting to be 6 by 6. It is true, on rich soil strong growers may require 6 to 8 feet for 5 or 6 years, but after they have borne several crops they will lose some of their vigor and then 6 by 6 feet will suffice.

The soil should be prepared by deep plowing and subsoiling. Before planting the vines should be cut back so only three or four buds of the wood will be above ground. Dig holes at least one foot square and as deep, with an incline on the lower or down hill side. Place the plants on this incline, so the crown or collar from which the limbs grow is placed not over two inches beneath the surface. Spread the roots (which should be first dipped in water, or puddled) cover them with an inch or two of pulverized top soil and then tramp this firmly against the roots. Fill in to near top and tramp again, but leave the last inch or two of soil loose, so it can absorb moisture and admit rains. Should the buds above ground fail to grow, because of some injury or by being rubbed off in handling, then the soil about the crown should be carefully loosened in order to give the reserve cluster of buds which nature has placed there, a chance to push out.

TREATMENT.

First year—This consists mainly in giving thorough culture and keeping the plants free from weeds. As the vines require only small proportion of the ground the first year, other crops, such as potatoes, cabbage and other vegetables can be grown to advantage in and between the rows. While grapes should have good soil and good treatment they should not be stimulated into excessive growth after the second year. During the first year, however, push them as much as you can and allow them to grow and ramble over the ground at will. If the growth is interfered with by pinching back the new growth or thinning out to one or two canes the root growth will be correspondingly less, because a checking of the leaf growth also checks root growth. No grass should ever be allowed to grow near the vines and yearly clean culture with proper pruning is necessary for best results.

Second year—In February or March cut back the leading central cane to five or six buds and cut away all small canes or limbs. Put up a trellis of posts and wire for the vines to run upon. Place the posts between every third or fourth vine, and be sure to have strong end posts, well braced. Staple three strands of No. 11 galvanized wire to the posts. The lowest wire two feet from the ground and the other two fifteen inches apart. Allow but three or four canes to grow up from the most vigorous vines, and one or two canes from those of lesser growth. Break off all other canes as they appear, so as to force all growth into the selected ones. As these grow up they should be loosely tied to the wires. If not tied up as soon as they reach the wires, many will be broken off by rains and winds. When the canes reach a foot beyond the top wires, about seven inches of the top

should be broken off, in order to force the growth into the limbs or laterals, for on these the most and best fruit is produced the following season. These limbs or laterals should be allowed to grow at will.

Third year—The leading canes left to grow the previous year are now pruned for fruit and should produce a full crop of grapes. Vines which have made a strong growth are allowed two or three canes and these are cut back to four or five feet in length. Less vigorous vines are confined to one or two canes. All other canes are cut back to two buds, which are then called "spurs," and these spurs furnish new canes for next year's fruiting. Those limbs or laterals on the canes which are strong enough, say of about the size of a lead pencil, are cut back to two buds. The canes, after pruning, should be securely tied to the wires, spreading them out fan shape, and curving the upper end of cane by tying it a foot or two horizontally along the middle or upper wire, according to the length of the cane. The cultivation of this and the succeeding years should be so regulated that through the blossoming period the vines can be left undisturbed, as a check to or undue stimulus of the growth through cultivation during this time may interfere with perfect fertilization, or setting of fruit. During the growing season carefully tie up all canes and limbs. Allow as many new canes to grow as in the previous season, with sometimes an extra one added. Remove all superfluous suckers or sprouts as soon as they appear. These generally start from near the ground. Sometimes two canes start from one joint in which case the weaker is removed, as are also such which show no fruit, excepting, of course, the canes intended for next year's fruiting. The ends of all new canes are broken off, as in the preceding year, and the fruiting limbs are treated in the same way.

Summer pruning has been abandoned by me as involving too much, and I might say, almost useless labor. Do not let your vines overbear at any time, but especially not during the first crop year. It is like killing the goose that lays the golden eggs. If too much fruit has set, some of it should be removed, the smallest bunches being selected for this. As a guide for the beginner, I will say that 25 to 30 bunches is the limit for a strong vine to carry the first season, and weaker ones should be relieved in proportion. As the vines grow older and stronger, 30 to 40, and even 50 bunches, are allowable on very strong vines. I have, on an arbor, a Concord vine which was deprived of 120 bunches before blossoming, and today, in counting those left, I found 130 bunches more which have set fruit. More than half of these will be taken off in a few days.

The first crop of grapes is rarely attacked by rot and is also less liable to the attack of insects than older vines. But in the years fol-

lowing it is advisable to spray with the Bordeaux mixture, as a preventive of rot. For the amateur, or small grower, I advise bagging the grapes, which is a sure preventive of rot and also a bar to worms and birds. I do not include bees, because I have never seen a bee puncture a grape, nor attempt to, after hours of patient watching. They simply finish the work which other and stronger depredators have begun. From the conformation of a bee's mouth, as seen through a microscope, I consider it a physical impossibility for them to cut or puncture the skin of a sound grape berry. As well might a child try to bite a hole in a rubber ball the size of an ordinary room. Bagging should be done here between the 6th and 12th of June. The proper time for other localities I cannot give, but it should be done as soon as the berries range in size from squirrel to duck-shot. I find No. 2 (or 2 pounds) paper-bags to be the best size. These are slipped—extended—over the bunches, the tops gathered and then fastened with a pin or tied. Should the stem of the bunch of grapes be too short to fasten the bag around it, then tear open the top of the bag about two inches, and bring the ends together over the limb to which the bunch is attached. Sometimes two bunches can be put into one bag. A small corner of each bag should be cut off, to allow the water, which, during a rain, often partially fills a bag, to escape.

Fourth year—This is similar to that of the third year. The old wood which has borne fruit is cut off, and the canes which grew during the previous summer are pruned for bearing. This is called the renewal system, and for ordinary purposes is best, because easier to understand and less elaborate than other systems. It can be, and by me is often varied, by allowing the old wood to fruit several years, provided it furnishes enough laterals for fruit spurs. In such an event some of the surplus young canes are removed. The pruning and treatment after the fourth year is the same. Pruning can be done at any time after the leaves have fallen until the middle or end of March.

The leading essentials to success in grape culture are :

First—Thorough cultivation.

Second—Proper pruning.

Third—Good drainage.

Fourth—Plenty of air and sunshine.

To this may be added that a vine must not be overtaxed, nor should it be over-stimulated. Nature points the way, and where mistakes are made, they soon become apparent to those who keep their eyes open.

CHAS. TEUBNER, Lexington, Mo.

DISCUSSION OF GRAPES.

By Mr. Miller—I think we have planted our grapes too close. I planted my last vineyard 7 by 9, and if I planted another one, I would make it 8 by 10. From observation you will find that the vines at the end of the row are the best in the row, simply because they have more room. Where vines have failed in the row, you will find vines at the end of the row doing better than the others; I will plant vineyards hereafter 9 by 10 or 8 by 10 in the row.

I would like to ask Mr. Williams how he runs his vines up; I plant a three wire tellis; used barb wire where I didn't have enough of the other, and I find it an advantage, because it holds the vines there. With the smooth wire, I don't care how well you tie your vines up, you let a storm come, and they will get all tangled up, and with the barb wire it is bound to stay, for it cannot slip more than two or three inches.

By Mr. Williams—I wanted to draw Brother Miller out, out on that point. For the last three years I have not used anything in my vineyard except barb wire for trellises. My reason for so doing is when you use smooth wire the climbers or holders that hold to the wire grasp around it, the vine frequently grows up and lays over, and you haven't always the time to go and fix that vine the way you wish it to grow, and that vine that is lying over the wire is frequently the one you want to take care of, why? Because the wind see-saws that vine, and in a few weeks it is so bruised where it lays over that wire that it is frequently no use to you. Use the barb wire and the vine will grasp around it and hold it there till the wind cannot move it.

Mr. Zink—I would like to ask Mr. Miller to name the six best table grapes—three best red, three white and three black?

A. I would say, the Early Victor, Wonder and Concord, and white, Moore's Early, Niagara and Pockington.

Mr. Chairman, I would like to correct Brother Miller, Moore's Early is a black grape.

Mr. Miller—I mean Moore's Diamond. For red, I would say Brighton, Ruby and Woodruff. These are early and late; the Woodruff is going to be the early grape pretty soon, it will take the place of the Catawba, and that is saying a good deal.

Q. I would like to ask what is the matter with the Goethe?

A. It is not hardy enough, if it was, it would be one, but it is not hardy.

Mr. Snodgrass—The Goethe with us is our finest red grape.

Q. The gentleman from Olden told us how many tons he produced, I would like to ask him what he realized off his thirty acres?

Mr. Snodgrass—I would say that my total crop averaged me about 2½ cents net; my wine grapes I sold for thirty dollars, I had eleven tons off of eight acres, eight thousand vines, my Moore's Early—the reason I advocate it, is because it is the earliest grape; my Moore's Early netted me 4½ cents per pound.

Mr. — I would like to state that my Moore's Early last until September, and I get for them about 4 cents per pound.

Mr. Miller—I would recommend the planting of early grapes; furnish all the early grapes and we would at least have that gain over the eastern growers. They cannot send theirs here until ours are past, and Moore's Early would be the best to plant. This year it is doing well for me for the first time. Heretofore it has not been very successful.

Mr. Snodgrass—I would state further, in regard to Moore's Early, that from some of my strong two-year-old vines I gathered three baskets of grapes last year; second year from planting.

Mr. Hopkins—I would like to ask if Judge Miller, or anyone else, has had any experience with a grape called the Jeweller?

Mr. Miller—I have. It is all I could ask of a grape if I could grow it, but I can't grow it; it is not strong.

Mr. Hopkins—About six years ago I paid 30 cents apiece for 10 vines. Last year is the first I have had on it. It is a delightful grape; early but not strong.

Mr. Kelley—I would like to ask something about a western grape, the Rose of Peru. They were never trellised, neither were they trained to a stake, but simply earthed up about 18 or 20 inches around the root of the vines. Those grapes can be grown without irrigation and produce in any required amount. I would like to know how you gentlemen in Missouri are going to raise grapes in competition with that latitude?

Mr. Miller—Are those grapes early as our grapes?

A. They mature in August.

Q. Have they ever been tried in Missouri?

A. I cannot answer that.

Mr. — They have all told about those early grapes. What I want is something later, to back against those grapes that come in in October and November, and some almost to Christmas. We want something we can use for a late grape. I think we have all the early grapes we need.

Mr. Miller—Plant Pocklington, Defiance and Norton. The Norton is as good a grape as I want, and the Defiance will keep in the sacks.

I have gathered them at Christmas. It is a black grape and it is the finest late grape I have had, but the vine must be well cared for or it will not bear well.

Mr. Murray—From the drift of this discussion it would seem that those present are about to come to the conclusion that we have nothing either earlier or later than is grown east or west to take care of ourselves with. Now, Mr. President, I wish to propound this question: Now if the New York and Ohio people can grow the Concord grape and ship them westward, and grow them on land worth \$200 per acre, and sell them out here as cheaply as they do, why is it that we can't grow them just as well on land that don't cost one-tenth so much, or must we come to the conclusion that we cannot compete with the Yankees in the east or the sharpers in the West? They have brought it down to a system, and they have the most thorough system of growing, picking and handling, and they send them down here by the car-load, one car-load after another, and I have been told that if they net 3 cents per basket for the 8-pound baskets they are making money. I think, gentlemen, if they can make money at 3 cents net on an 8-pound basket, I think we can live and make money by growing them here.

Mr. Snodgrass—I would like to ask if they use cold storage, or if it is cool storage without the use of ice?

A. I cannot answer that question, but they certainly do hold them back nicely.

Mr. Snodgrass—I have been told that grapes shipped in cold storage cars, when taken off the car fall off their stems and are not salable. I do not believe that it is practicable to put grapes in cold storage. I know South Water street merchants carry their grapes in the back part of their business houses for months, but there is no cold storage and it is simply cool.

Mr. Murray—That would be much nicer and more simple.

Mr. Barnes—I think Mr. Snodgrass is about right about that matter; I had a great many grapes in cold storage last fall, and there were not more than three or four varieties when we took them out after from three to six weeks; that the loose grapes did not fall off and cover the plate, and I do not think you can keep them in cold storage, but I have seen them in stacks and stacks along Lake Erie in cold storage; they were picked and put in the baskets and they were never taken out from the time they were put in until the people out west here took them out, and the baskets are packed up there all around the walls, and I do not think there was anything there but atmospheric cold. I

think one trouble is that our grapes grow where it is too warm to keep them.

I wish to speak a moment about the California grapes ; we have a man in Southern Kansas who has been trying the California grapes and he is well pleased with his success ; he had no faith in them at first, and some Californian sent them to him and now he is well pleased and finds them very fine, and he especially mentioned the Countess Seedless ; it is a seedless grape and one of the most delicious grapes he ever tried. I do not know what will be the result of that, but if we can raise those grapes in this latitude lets try it ; these things are worth trying.

Mr. ——— I would like to ask one question : if it is not the honey bee that destroys the grapes, what is it ? In Pennsylvania the grapes will ripen and hang on for weeks and months in good condition, while here they can hardly hang on until they get ripe until they are destroyed by something, the bees or yellow jackets.

Mr. Miller—The yellow jackets, wasps and bees go after ; something else has done the work ; honey bees are the rear guard.

Mr. Snodgrass—Honey bees have never bothered my grapes ; bumble bees will.

By Prof. Stedman—I have heard of a good many cases of honey bees working on grapes. I have never known of an actual case where honey bees punctured a grape ; the puncture is made by something else and the honey bee goes and sucks the juice, but from close observation I have never been able to detect a honey bee in the act of making a puncture.

——— I have a small vineyard and Mr. Snodgrass is close enough for his bees to go to it, and I have taken the pains to watch them very closely, and while my yard and orchard are covered with bees, I am confident that a honey bee never broke the skin on a grape, berry, apple, peach, or anything else.

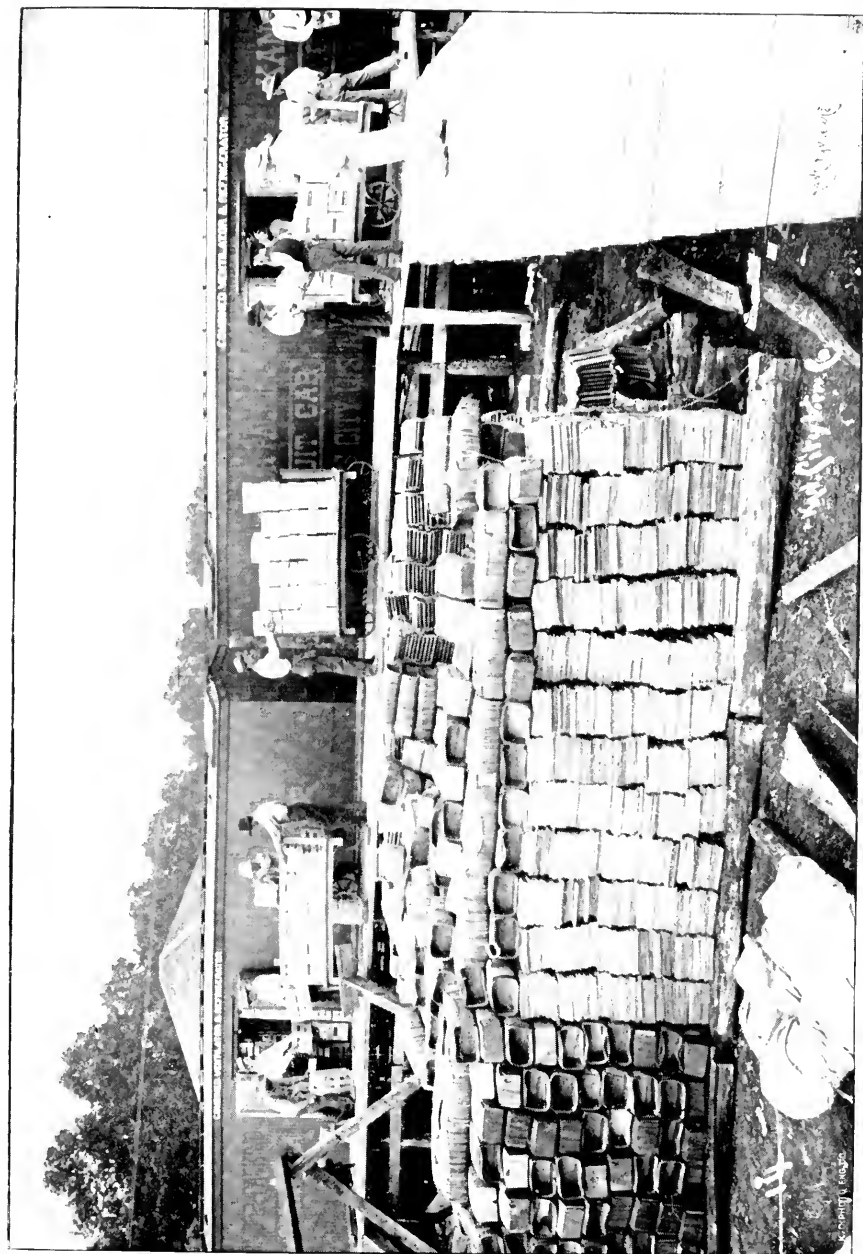
Mr. Williams—I have made a close examination and scientific to the best of my ability as a farmer, and I will make this proposition that I will give one hundred dollars for the grape that a bee ever broke the hull upon.

Q. I should like to ask the gentleman if he means all bees ?

A. No, I mean the honey bee.

What I was after was to get a preventive of this puncture of the grape.

Mr. Zink—I am a bee crank, too, and I am glad to see the harmony that exists between those interested in bees and those interested



SHIPPING PEACHES FROM A MISSOURI ORCHARD.

in fruit. It has been settled for some time that the bee is undoubtedly a friend to the bee-grower instead of an enemy.

Mr. Howard—I would like to ask Mr. Miller how long the Concord will keep if you have it sacked?

I have never tried it; I have seen so few of them; they always get consumed before I can try them. I can keep the Defiance and Jefferson until after heavy frost and take them in sound and plump in sacks. While we are speaking of sacking, I have tried something simpler than the sacks; it is to take a piece of paper, according to the size of your grapes, and cut a slit in one side to the middle and then fold this around the grapes; the paper is to be circular in shape, and by pinning it there will form a kind of canopy. I hope some of you will try it.

PROFITABLE PEACH GROWING.

In looking over the program of this meeting sent me some time ago by our Secretary, I was somewhat surprised to find my name connected with it, the subject given me being "Profitable Peach Growing." Now, in the outset, I will say my experience in profitable peach growing is very limited and I will be compelled, therefore, to confine my remarks to other phases of this branch of horticultural work. Yet while it is true that the very important requisite, that of profit, has not been experienced to any degree by myself thus far, still I am by no means without hope, for there is a fascination about this work which for me is very strong and which spurs me on to increased effort whenever anything of the nature of a drawback appears.

Anyone with a love for horticultural work, having cultivated the trees and harvested a crop of beautiful Elberta peaches in Missouri, is not easily discouraged. The borers that infest the roots of his trees will be dug out cheerfully. Log and bush heaps will be made in his orchards to be burned, when by careful and frequent nightly examinations of his thermometer he finds that his prospects are endangered by frost. More than these he will use every effort to overcome the various fungus enemies, which in their subtle and insidious attacks, threaten to destroy his trees. In one of these, the leaf curl, he will, in my opinion, find his greatest trouble. This disease is doing much damage in our orchards at Neosho. In one block containing 900 trees 200 have either died or been ruined by it in the last 15 months.

Trees, to all appearances, in a perfectly healthy condition last fall are now almost destitute of leaves and dying rapidly; while others are effected on one side or in spots, other portions remain healthy,

growing well and even bearing fruit. These healthy portions will probably be destroyed next season if the fungi should develop then. My efforts in the way of spraying for leaf curl have not been attended with success. Two applications were made this season, the first late in February and the other before the buds opened in March. Bordeaux mixture was used and the work was thoroughly done.

Since this disease first attracted my attention in our orchards, I have noticed it in several other orchards in the county and even on isolated trees. Some varieties seem to be exempt from its attacks thus far. Among them are Elberta and Thurber. Those most effected with us are Old Mixen, free and cling, Early York, Heath Cling and those of the Smock type.

While I have not been successful in overcoming this disease, I trust that I may at this meeting learn wherein my mistake lay and correct it in the future.

I am glad to be present with you here, if for nothing else than to bring this matter before the people of Missouri, for should the leaf curl develop generally over the State as it has in Newton county (and there is every reason to believe it will), it is high time that effective measures be taken to prevent it and that reliable information be freely distributed upon the subject.

Now, in conclusion, I will say that the prospect for peaches in Southwest Missouri is splendid this season. The curculio seems to have done very little damage and all healthy trees are so loaded with fruit that before this Society meets again I hope to have had some experience in profitable peach growing.

F. H. SPEAKMAN.

PEAR BLIGHT TO DATE.

Whether it is possible or not to throw any further light upon this vexed and difficult subject in horticulture, it is at least worth while to condense in a brief statement the results of the latest investigations concerning its cause and the prevention of it.

The writer has for years done some personal work in this direction, and has at the same time made use of all the information he could obtain concerning the researches of others into this subject. It is now definitely determined that pear blight is a contagious bacterial disease specially affecting pears and also some other kindred fruit trees. The microbe is very minute. It was discovered by Prof. T. J. Burrill in 1879, and its scientific name is *Bacillus Amylovorus*. The microbe feeds chiefly upon the inner bark, especially upon the

fresh cambium layer. It begins its work at the time of blossoming, the microbes living in the nectar of the blossom, whence they are distributed by bees and other insects, so that if a few early blossoms are affected the insects will scatter the disease from flower to flower and tree to tree until it becomes epidemic in the orchard.

The microbe may enter at the blossom and then run downward on the branches, but in young trees they often enter the tips of growing shoots and then run downward, producing what is sometimes called twig blight.

The extent of the ravages of this microbe generally are only an inch or two a day, but sometimes reaches as much as one foot. The more rapid the growth of the shoot of the pear twig and the softer its tissues, the greater the injury. So such rapidly growing varieties as Bartlett or Clapps' Favorite suffer worse than the hardier, slower growing varieties of Duchess and Keifer.

Warm, moist weather is favorable to blight; cool, dry weather unfavorable. Most of the damage done is in a month or two following bloom, but young trees may be attacked at any time during the summer.

The signs of the presence of the microbe are the turning of the bark of the extremities dark brown color, and a more or less shriveling of the bark. A few days later the leaves blacken or brown, but remain for some weeks attached to the tree. All the parts of the tree below the point reached by the blight are healthy, no more injury resulting than if the blighted parts had been girdled.

It has been proved by experiments made by Mr. M. B. Waite, assistant in the United States Department of Agriculture (see Year Book for 1895, page 295), that the microbe lives through the winter in the bark of the tree, and that even freezing winter temperature will not destroy it. On the other hand, very dry weather and cessation of growth in the tree furnishes conditions unfavorable even for their life.

Such in brief are the conditions which produce the disease. What now are the remedies? Can anything be introduced into the life of the tree which will be unfavorable to the propagation and destructive ravages of this microbe?

In the dozen years or more of pear culture in my own experience, I have used unsparingly the knife. Watching the trees from day to day during spring and summer, I have cut or sawed off the affected part and any branch affected, and at once carried it to the stove and burned it or else built a fire in the garden or orchard for immediate burning, never allowing an affected twig to remain 24 hours without cutting.

I have at the same time liberally used wood ashes sometimes mixed with common salt for fertilizers. While in one or two cases trees were considerably injured by the blight, in ten years I have never lost a tree, and in the last two or three years of cultivation of the orchard with which I had most to do no signs of blight were visible. I should add, however, that my experience has been in Massachusetts and New York, not in Missouri.

But Mr. Waite, in the report already alluded to, holds that trees highly manured with barnyard manure and other nitrogenous fertilizers are especially liable to the disease, and that overstimulation with fertilizers is to be avoided. My own theory is that potash tends to stimulate fruit, but that barnyard manure tends to great growth of wood.

Mr. Waite also thinks that pruning in winter time increases tendency to blight since it pushes the tree to make a great growth of wood which is tender and so nourishes the microbe. Much tillage has the same effect, says Mr. Waite, and he suggests that plowing between the trees early in the spring and then seeding or sowing to grain, or else plowing the middle of the space between the rows, will produce the whole, the best results. Every tree of the Pome family is liable to the blight. Pears are effected most, but the quince, apple, crab-apple, mountain ash, and all the hawthorns are found with it.

The only sure remedy is cutting and burning diseased branches. This should be done in the fall before the leaves grow dry, then early in the spring as soon as the blossoms appear, and again at intervals of two or three weeks through the summer. Never allow an inch of a diseased twig to remain for an hour on the tree. Eternal vigilance is the only method of success.

HOMER T. FULLER, President Drury College, Springfield, Mo.

DISCUSSION ON PEACHES.

By Mr. Murray—The Champion suits me best; had three bushels to the tree last year, and have good crop this year. It is a free stone. As a rule the yellow varieties are not so hardy in fruit or wood as the white. The old Smock has made me the most money of the yellow varieties. It is no trouble to sell peaches in North Missouri at 50 cents to \$1.50 per bushel. Men come from Iowa with wagons for the fruit.

By Sec. Goodman—I would not grow a single one of the earliest varieties. Plant Mountain Rose, Early York, Family Favorite, Elberta, Salway and Mixen, which ripen in the order named, giving a season up to October. Have a succession of varieties and have an under-

standing with dealers so they can depend on you. It is important to establish hardy varieties, which can be done. The Experiment Station is working on this line. Don't let your trees overbear.

Mr. D. S. Helvern, of Mammoth Spring, Ark., said he had ripe peaches June 5th this year, which were good keepers and carried well.

Discussion on leaf curl was resumed. Prof. Whitten advised severe pruning early in spring and spraying. In California the disease has been controlled by spraying three weeks before the buds start and again just as they do start. Use Bordeaux mixture with lime. Cutting trees back now will help the tree to outgrow the leaf curl. Same treatment will do for plum pocket.

By Mr. Speakman—The leaf curl is doing great damage at Neosho. Trees cut back in winter are suffering.

By Prof. Whitten—Cut the growing twigs.

By Sec. Goodman—To cut the tree while growing would ruin the tree. The reports of advantage of pruning new growth must have been wrong.

By Col. Evans—We have never lost a tree from leaf curl. We give all our trees wood ashes every year. For a bad case take lie, boiling hot, made from wood ashes, and pour it over the roots, and in ten days you will have a well tree.

The following are the formulas given by Mr. Stedman:

For peach and plum trees for biting insects—Arsenate of soda, 4 ounces; acetate of lead, 11 ounces; water, 100 gallons.

Kerosene emulsion, for sucking insects—Hard soap, one-half pound; boiling soft water, 1 gallon; kerosene, 2 gallons. Churn ten minutes and add 19 gallons of water.

For biting insects, except on peach and plum trees, where you cannot use Paris green—Paris green, 1 pound; fresh lime, 3 pounds; water, 50 to 175 gallons.

Bordeaux mixture for spraying—Copper sulphate, 4 pounds; fresh lime, 6 pounds; water, 50 gallons.

WEDNESDAY. 8 P. M.

Music—String quartette.

HOW TO MAKE A LAWN.

In its strictest meaning, a lawn is a stretch of grass around a place, or intermingled with trees and shrubs; but in a broader or more complete sense it embraces the trees and shrubs themselves. The

subject will be briefly treated from both standpoints, but especially from the first, as upon its success depends the future appearance of the whole surroundings. Prof. Bailey aptly suggests (Bulletin 121, Cornell Experiment Station, September, 1896), "that if a landscape is a picture, it must have a canvas. This canvas is the greensward; upon this the artist paints with tree, and brush, and flower, the same as the painter does upon his canvas with brush and pigments." Furthermore, the bare ground is the rough, unpainted canvas, the greensward, the painted background, which, together with properly arranged ornamentals, forms the picture. Without a proper background the painting would not be effective, neither would a background be attractive without the picture—both are eminently important.

The first thing to be done in the preparation of an ideal lawn is grading. The mode of operation will depend largely upon the condition of individual places and to some extent upon individual taste. If the area is naturally undulating, it will only be necessary to smooth over the rough portions, but if level a better appearance is often secured by giving a little slope, except in very small lots. If there is too much difference in elevation it should be modified accordingly, the amount depending on the size of the place and natural surroundings. In either case the area should slope from all sides of the residence to a greater or less distance, merging gradually into the general trend. Abrupt changes should be avoided as much as possible, though terraces are necessary when the location is on a steep side hill, in which case they should be kept near the house or along the side of the lot. In general, the grading should be done in such a way that all surface water will be evenly distributed, so as not to form numerous runs which may cause miniature washouts.

It is unnecessary to speak of drainage, as this is only required in places where water is liable to stand a portion of the year.

Preparation of the ground, however, is supremely important. If the soil is poor, it should be thoroughly enriched by a liberal application of well-rotted manure, bone meal, wood ashes, or other good fertilizer.

The use of manure is attended with considerable danger of bringing in foul seed; otherwise it is one of the best fertilizers. The ground should be plowed or spaded not less than eight inches deep, removing all stones and other like material, and the surface made as smooth as possible. All is now ready for seeding.

One of the best mixtures for a lawn is four parts Kentucky blue grass (*Poa pratensis*), with one part of white clover (*Trifolium repens*),

sown at the rate of five bushels per acre. I have seen equally good results with red top (*Agrostis vulgaris*) in place of Kentucky blue grass; also with equal parts of red top and Kentucky blue grass, with about two pounds of white clover to a bushel of the former. When moisture conditions are favorable the Kentucky blue grass forms a softer and prettier greensward than red top, but does not appear to endure drouth as well. Again, red top has a tendency to form bunches, unless growing very thick. From these observations it appears that more or less sheltered situations, where the full rays of the sun does not penetrate and where the ground does not quickly dry out, the blue grass and winter clover mixture is unquestionably the best, but in more exposed situations a mixture of equal parts of blue grass and red top, with a little white clover, is preferable, as it is much more certain to withstand drouth. Rhode Island bent grass (*Agrostis canina*) has also been recommended for this purpose. The quality of the seed selected is of more importance than the selection of any of these varieties. Absolutely pure seed is often difficult and even impossible to procure, yet nothing but the highest grade should be accepted.

It is impossible to give the best time for sowing a lawn, as the weather cannot be predicted far enough in advance. Different plots of grass have been successfully grown when planted any month in the year except January and February, and at other times they have been absolute failures when treated in the same manner. The most frequent failures appear to be where the seed was planted in autumn, and not having time to much more than germinate before severe winter weather began, much of the grass is winter-killed. One of the most satisfactory results with a lawn that ever came under my observation was one planted last December.

None of the seed germinated until spring when it all came evenly and now bears the appearance of a well-formed turf. Some of this year's planting will ultimately be as satisfactory, though not as far advanced; and that sown since April 1st is much better than what was planted previous to that time. Some recommend sowing about mid-summer, and by winter it will have made sufficient growth to endure the severe weather, the only objection being the greater liability of drouth during this season of the year.

After the lawn is sown, careful attention should immediately be given, first to rolling and afterwards watering. The ground should not be allowed to become very dry, and when watered should be thoroughly soaked. Rolling should continue every few days after the grass is up, and should be done immediately after watering. Mowing should follow at regular intervals, never letting the grass get beyond control of the

lawn mower. After the lawn is well established, the further application of some fertilizer annually, or, at farthest, every alternate season, is essential, using any of those employed in the original preparation of the soil. Each possesses the same relative value with the possible exception of manure which has the additional objection of being unsightly while on the lawn. Bone meal at the rate of 600 pounds per acre is especially good for this purpose. While it does not act as quickly, the important objections to the use of manure are avoided. In applying bone meal, I like to mix it with about an equal bulk of clean soil and let the mixture stand three or four days to slightly ferment, when it seems to act more quickly on the sod.

Lawns are often made by sodding with turf brought from other places. This is desirable for immediate effect when the expense is not an item, and often with better results than sowing seed, where perfectly clean sod may be had. Moreover, sodding is quite essential on terraces or other abruptly rolling places where the soil is liable to wash down before a turf is formed. It is a good plan to have clean cut sod for edging along the walks. The ground is prepared the same for sodding as for seeding. The sods are cut in convenient sizes and about one and a half inches thick. The ground should be sprinkled just before the sod is laid and again immediately after.

But little need be said concerning the planting of ornamentals. The many conditions that must be taken into consideration makes it difficult to formulate even very general rules. The extent and contour of the grounds, the style of the residence and natural and artificial surroundings are all of vital importance to the harmonious arrangement of the whole. The selection of varieties is of secondary importance. More frequently many of our common native plants might be utilized, and may often be procured for the mere labor of transplanting. Taking a specific example, such as a narrow city lot, with only a rod or two of ground in front of the residence, is too small for a large growing tree, though one or two should be planted in the street in front of the lot. In such a place I should only plant some low-growing hedges, such as California Privet (*Ligustrum Iboia*) around the sides, and one or two small, solid clumps of shrubs, or moderately growing herbaceous plants, banked against the porch, at the side the steps or the corner of the residence, with some climbers, such as ivy, clematis, climbing bittersweet, morning glory, hyacinth bean or cypress vine, over the porch or a portion of the residence and on any unsightly fence that may surround the lower

In the rear yard the walk leading to the alley should be narrow and at one side. A few shade trees should be planted, together with a

narrow, irregular strip along the sides of whatever shrubs and herbs best suits the taste. These should be just far enough apart to make a solid mass when full grown, planting larger ones in the background, gradually dropping toward the front with various smaller plants. The amount that can be planted in such a place is surprising, and still have room for plenty of grass in the center.

A farmer's lawn is usually much more spacious than so many of the narrow city lots. In fact, it may be compared with the large city places, upon which hundreds and even thousands of dollars have been expended, and yet a farmer's lawn may be made as attractive with a few dollars' worth of labor and material, and much less attention is usually required in preserving it. The ideal arrangement of such a place requires the skill of a landscape artist, a title which I cannot claim. The residence is, or should be, situated some distance back from the highway, giving room in front for several shade trees and clumps of shrubbery. These should be arranged to cover unsightly objects, whether far or near, and at the same time preserve desirable views from some of the most prominent positions. In general it is best not to scatter the trees in all parts of the lawn, but keep in groups and have at least one large open space with various nooks or retreats and places that afford dense shade as well as the bright sunshine. The location of walks and driveways is an important feature. There should be no more of either than will constantly be used and both should extend directly toward the place to which they lead and not in a roundabout way, not necessarily in a straight line, but with a gentle curve around and between clumps of shrubbery. As a rule it is best to have but a single driveway leading from the road past one side of the residence and back to the stable, with a small circle between the residence and stable on which to turn. There may be places where a double gateway with a driveway curving from one to the front of the residence and back to the other, with a branch running back to the stables would be preferable, but I think they are few. A walk in such a place is much more desirable than a driveway.

Between the small city lot and this more spacious one there are infinite gradations, each requiring special consideration, for which I have not time, space or talent.

H. C. IRISH, Missouri Botanical Garden.

ADDRESS BY PRESIDENT JESSE OF MISSOURI STATE UNIVERSITY.

When Missouri State University was founded, even Chicago, that great city by the unsalted sea, that claims like Melchisedec of old, to have neither beginning of days or end of life, was only then seven years old, but even in knee-breeches stage it was putting on those boastful airs which has characterized it ever since. Texas, now the largest State in the American Union, was then an independent government by itself, while New Mexico, Arizona, Utah, Nevada and California all belonged to Mexico. They were all foreign territory. Kansas, even now the bolder wild people, still wilder then, was not admitted to the Union until twenty-one years afterwards. In fact, the only states west of the Mississippi river were Louisiana, Arkansas and Grand Old Missouri.

Among our public men the illustrious Benton in the twentieth year of his service in the Senate, was covering with glory the name of Missouri.

Henry Clay and Daniel Webster were in the prime of life, and Washington were leading to victory the old Whig party, of which the younger members of this meeting know only by history.

William Henry Harrison, owner of Grandfather's Hat, which you see in the cartoons in the newspaper, was in the act of becoming President of the United States.

The Democratic party after holding under one name and another the reigns of government for forty years, was on the eve of overthrow.

Calhoun and Benton and Jackson, whose names shall live forever in the annals of Democratic statesmanship, were working like tigers to save their party, but it was written in the Book of Fate that they were to triumph, and so they did. As for the Republican party, it was not born, or even dreamed of. Mr. Lincoln was only thirty-one years of age, General Grant was only a stripling of eighteen, and Grover Cleveland, the mighty of girth now, was at that time only in kilts, and as to William McKinley, our President now, it had not entered into the hearts of men to even conceive of him.

In such a time was our University founded, the only exception from the Alleghany mountains to the sea, except Indiana and Michigan. She was granted 60,000 acres of ground on the condition that she establish and maintain a seminary of learning; much of the ground upon which Westport and Kansas City now stand belonged to this

original Federal land grant. The founders of the University, the men who laid the corner stone, were not favored with the gift of prophecy, for they sold the land that Kansas City is now on for \$60,000. Kansas City owes the University a handsome endowment in some way.

Starting with this endowment of 60,000 acres of land, the University has grown 57 years to nearly a million and a quarter of dollars, the largest interest-bearing endowment possessed by any State University on the continent of America, excepting California alone. Michigan and Indiana are "not in it" as the boys say.

The University has received since that time a variety of gifts from the Federal government. One in 1870, that is to say, one that was made effectual in 1870, for the foundation of the Agricultural college, another in the form of an annuity under the Hatch act, and still another in the form of an annuity also under the Sigel act, so it is hard to say, as we review the history of the institution, whether it owes more to the State than to the Federal government, or more to the Federal government than to the State. It owes much to both. The growth of the University since that time has been very great; it has added on in these 57 years professional departments of law, medicine, engineering, military science, agriculture, entomology and last but not least, undergraduate studies; it has now, starting fifty-seven years ago with one department, it has now eight of which two are chiefly academical, and the other six strictly professional.

Since 1891 the growth in the University has been almost marvelous; if I should tell you of its growth in that time, you will think I am afraid, that I am boasting, but there is no reason why I should boast; the University as an institution has grown, I am the same size I was in 1890. In six and one-half years, not quite six and a half, the High schools with the University has been increased 150 per cent, while the quality has been immensely increased. The enrollment of students has increased 42 per cent if you compare absolute numbers of today with the numbers of six and one-half years ago, and in comparing 1897 with 1891, you deduct the preparatory classes, which do not exist now, and the growth in students has been 120 per cent. In six and one-half years the annual income of the University, even in spite of the desperately small appropriation of our General Assembly, has increased eighty per cent, the interest-bearing endowment has grown one hundred and twenty per cent, and buildings more than double the number whether you count them or measure the floor space, have been greatly improved in every convenience and adaptation to their purpose. Some branches have been wholly created, while in law, in agriculture, in horticulture, mechanical arts and in the sciences the institution has been so greatly

improved and so enlarged as to make, its in these directions, practically a new University.

All this has been accomplished, you must remember, and Missouri should take pride in it for it is their University, in six and one-half years, in spite of a bad fire that destroyed well nigh all the buildings and equipments that had been accumulated.

In spite of four years of the hardest times that ever afflicted the people of this State and last but not least, in spite of very small appropriations from the 38th and 39th General Assemblies, if these two Legislatures had done their duty by the University as faithfully as did the 36th and 37th, the record of recent growth in the University as great as it is, would have been far greater, but I am glad to tell you that in spite of its enemies, and hinderances, and in spite of all its misfortunes the University of your State stands today, for the amount of its endowment in buildings and equipments, the foremost institution of learning from the Mississippi river to the Sierra-Nevada Mountains. I wish that I could give that statement to the sea of Japan again, but California stops me on the crest of the mountains.

I should tell you that the students come from all counties of the State, and they come moreover from 38 states and territories of our own land, and from four foreign countries.

The reputation of your University is universal; it is well known among all the people engaged in higher education; well known from the lakes to the gulf, and from ocean to ocean. But I should fall below the institution, standing before an audience as intelligent as this one should I talk about only one institution should that even be your own State University. For what I have said I wish to make no sort of an apology here or hereafter; if I were representing a private institution of my own I would not try to stand before a Horticultural Society of this State or any other state; if I were representing a college of some denomination or order, Masonic or Odd Fellows or something of that kind, I should be presuming upon your kindness to talk about that institution, but this is the University of the State of Missouri and you are Missourians, with the welcome addition of our friends from Kansas and Iowa and a few other states, but the bulk of the audience consists of Missourians, and this is the University of the State of Missouri. It does not belong to me; I have no more right in it than any one of the three million six hundred thousand people that belong to this State; I have just as much right as you have there and no more, so far as my proprietary right is concerned, therefore, I shall not apologize for standing before any Missouri audience, intelligent and interested in

education and telling them of their State University, but it is important that we look at something else besides one institution.

I take it for granted you want to hear from me about education, and education a little more broadly than it is found in any one institution.

It is a subject of gratitude, a fact for which we cannot be too grateful that college education of good grade is obtainable in a large number of places; it is obtainable in our State as well as in other states; as well in the East as in the West; at great and small expense—very cheap at Columbia; obtainable under the different denominations; you have a very admirable institution here, of which you should all be proud.

We should be thankful that the Providence of God has made it possible for the young man and woman to get a good education in at least seven or eight places in this State. The most important thing for people to do is to get a college education somewhere. I speak to you as people who consider in one way or another the destinies of young men and young women; it is, in my opinion, one of the most important things for a young man or young woman to do, to secure at all hazards, provided only honest means be used, a good college education somewhere.

Americans are always prone to ask practical questions, and sometimes ask, does a college education really pay? I have been asked that question a thousand times and always answer "Yes it does." Probing will show that that question always means this: "Does it help a man to make money?" Does it raise him to prominence in the eyes of the world? In other words, does it lead to high living, fine clothes and delicate fasting and champagne? I protest against any such estimation of education as this, but yet I am willing to put it on the lowest grounds and answer, yes it does pay. It is true some millionaires have made their millions without any education, but for every one of such millionaires I can point you to thousands of boot-blacks who have not any education or any fortune either.

If you will collect in one bunch all those who have been educated at college and in another bunch all those who have not been educated at college, I will warrant that the average wealth of the first class will be greater than that of the second class; I will warrant that the morality of the first, I will warrant that the health of the first and that the social position of the first class will be, on an average, better than the second one. Or let us make it three classes: first, those that were educated in college, then those that were educated in high school—not in college—and third, those that were not educated in either high school

or college, and I will grant that the average wealth in the first will be greater than in that of the second, and in the second greater than the third; so that if you compare them in respect to health or morality, in respect to religion, in respect to prominence, or in respect to any other good thing on earth you will find similar results. Yes, from the lowest point of view education does pay.

The history of our country will show how much we owe to college men. I will show you a few things that ought to prove interesting to any intelligent audience, and certainly I am standing before an intelligent audience tonight.

The Declaration of Independence, which is the corner stone of our country, which had as its mission the emancipation of the human race, was written by a college bred man, by a graduate of old William and Mary in Virginia. Of the men that signed that document it would be surprising if you would examine into the question how many had been in college. Take the men who framed the constitution of these United States, how many of them were college bred—you can usually find a list of them in any college library—and then find out where they were educated, and it is astonishing to see how many of the men who controlled that were college bred. Take the Supreme Court of the United States and you will find that men who have dominated were bred in college.

It is impossible for us as a nation—equally as impossible as a State—to escape the college bred man; he has lain his hand on the State and nation and his impress is on our history.

If you will take the records of the army and navy you will find that few of our great soldiers of land or sea have ever reached eminence without passing first through the U. S. Military Academy at West Point and on through at Annapolis.

I know full well that people are fond of pointing to George Washington and Abraham Lincoln, both mighty men, as examples of what men can do with little schooling. Yes, they had very little schooling, neither of them ever rubbed the whitewash off the walls, even with their elbows, but, my friend, that will do you no good, very little good unless the Almighty has made you like George Washington and Abraham Lincoln. The Almighty does sometimes make a man so great that he reaches eminence of no low creation, but those men are few and far between in the history of the world. In new countries men are dependent upon the qualities within them, but as people advance in civilization, opportunity becomes smaller and competition becomes greater; the chances for success in life were much greater in the days of George Washington than in those of Abraham Lincoln, greater in

those of Lincoln than they are now, greater now than when these young men and women reach my age, and I am far from being old.

If you wish to see what we are coming to in this country, cast your eye upon Europe. There the competition is so great, opportunity is so small that men cannot get to the front at all without superior natural abilities and without superior education. It takes superior ability magnificently educated to get to the top. So it will be here before any of these younger ones reach the age of three score years and ten. There are men to-day in prominent positions who could not reach the same prominence twenty years hence with their present equipment.

It seems to me that as our State moves forward in material progress, that the demand for education is going to become greater and greater; fathers should remember that their sons will have a harder struggle for success than they have had, and every father, it seems to me, should strive to give his son that advantage which comes through education. President Wing, of Cleveland, who hasn't a great deal to do, as I have, and hence has time to work up all sorts of statistics for others who are busy men to use, has calculated that of all the college graduates in this country, from the earliest statesman down to the present day, including foot ball enthusiasts and spider-legged dudes, that one out of every forty has reached such prominence as to have a sketch of his life put in Appleton's Encyclopædia of American Biography, whereas in all the other men of this present century, from the earliest statesman to the present time, but one out of ten thousand has reached such prominence.

I have used figures, and they are correct, but should you throw them away and say that one in four hundred, instead of one in forty, and for those who haven't been in college, say one in four thousand, instead of ten thousand, and still the figures show that college education does pay; it secures to the young reasonable prominence, modest wealth, usefulness and character in life. There never was a time in the history of our country when the need was greater than it is to today for really strongly educated men. It cannot be denied that more than half, at least half, of the wealth of our country, is possessed by less than one thousand men. Sneer who may, for I know some would sneer at such a statement, but it cannot be denied that the rich are growing relatively richer and the poor are growing relatively poorer, and that is a statement that no sneer will dismiss, and if present tendencies are not suppressed, it will be worse twenty years from now than it is today. It can not be denied that the pools, trusts and

combinations that people are forming today are a nuisance and should be resisted by every manly man.

On the other hand, when we turn to the poor, and there are men upon men to turn to, the prospect is scarcely if at all more comforting; they are becoming animated by a spirit of revolution and want, not only toward the pools and trusts and corporations that had robbed them in many instances, but toward all capitalists and all corporations indiscriminately and blindly. Here then are the forces of destruction blindly patient; on the other hand are the masses, and between them stand a thoughtful, conservative, patriotic class that is, in my opinion, the hope of the country.

Recitation—Jack and Gill, by Miss Emma Evans.

THE SCHOOL OF HORTICULTURE.

Paper read before the State Horticultural Society.

The first class of the School of Horticulture at the University thoroughly agree with Mr. Goodman when he said in one of his reports: "In the realm of labor or professions there is nothing so fascinating as the study of Horticulture." I wish more of the young people of Missouri had attended the lecture and practicums last winter and received with us the inspiration from work and association with our instructors.

Too many of the boys and girls growing up on the farm see nothing of the pleasures of such a life. The beauties around them are lost and the insects and plants appear only as "bugs" and weeds to be gotten rid of, or as plants that should be tended for their money value. The life in the flower is lost to them.

"A primrose by the river's brim
A yellow primrose was to him,
And it was nothing more."

What wonders botany, the study of plant breeding, cross pollination, floriculture and landscape gardening would reveal. Nature would mean more to them, and the farm would become a world for study, and they might say with Tennyson:

"Little flower, if I could understand
What you are, root and all, all in all,
I would understand what God and man is."

Not only the plant life, but the insects with their varying forms, their habits of life and characteristics would be of interest. A beneficial insect would not be destroyed, because it happened to be a "bug"

or worm. The wonderful transformations going on about us every day in the insect world are well worth our time and thought.

We need a thought of the interesting and beautiful in life to make lighter the hard burdens men must bear, and if the study of the plants and insects for the pleasure to be derived from it will make farm life more attractive it should be given a proper place on the farm. However, in our work last winter the practical side of Horticulture was ever first. The insects were studied for the protection of our fruits and gardens with the best methods of destroying injurious ones. The lectures on the nature and life history of the different fungi gave us the reason for our work in spraying and destroying the diseased fruit, while landscape gardening and floriculture will help us in improving our farms and the country around, as the planting of trees and other ornamentals is becoming a practical question in many sections of the country.

A subject which interested me was plant propagation and its relation to the improvement of our fruits and garden produce, and the different methods employed were spoken of by different lecturers. The experimental station is doing what it can to improve our fruits by selecting the best for grafts and buds as well as seed, and also by cross-pollination. Every horticulturist should understand this work, and as far as possible, aid in carrying it on. In our orchards, for example, there are trees that bear superior fruit and yield abundantly; we could expect better trees grown from scions taken from those trees than from those taken from trees having inferior quality of fruit. In our vines and berries we know there is a choice. Then why not try propagating from the best instead of going haphazard as is usually done?

The nurseryman, to whom this work naturally belongs, meets with too much competition to carry it on to any great extent, so it has fallen to the horticulturist to carry on this most interesting work. We have heard how much the perfection of our fruit depends on cross-pollination, and if he could follow farther and grow the seed we might, in time, by proper cross-pollination produce wonderful results.

A month spent in nursery work not only gave us a glimpse of what the nurseryman does, but how the fruit-grower can apply it to his own home. We studied enough of the nature of the plants to understand why so many of these wonders of which the traveling salesman tell could not be expected to come true to the description. The nature of grafting and budding was explained, together with work in the grafting-room. We were told of the proper care of the plant, not only in the nursery row, but on its way to the farm and after the buyer has it in his own hands. The farmer, often through his own ignorance, loses his

nursery-stock, and then the blame rests upon the nurseryman. We found there was a difference in roots and the method of treatment they should receive, and what stock was best adapted to many sections of Missouri.

These lectures prepared the way for the work in orcharding and small fruit. It is surprising how few people really understand the nature of the different plants enough to transplant them properly. It is often asked why it is so hard to make our trees grow. Especially is this true of our ornamentals; and if the facts were known the roots may have dried, the tree have been injured in some way, or, as is often the case, the trouble is in the planting. Nature does her best to protect her children, but man in his ignorance abuses them.

We learned many other mistakes made in the care of our orchards as we followed the tree from the nursery, saw it properly planted, and learned the care it should receive from year to year until the profitable season is past. The small fruit, as well as the orchards, were thoroughly discussed. Our afternoons we spent in pruning and studying the fruits. One practicum, which was especially interesting, we spent in a model orchard a few miles out of the city.

During our last month we had lectures and work in market gardening. The vegetables themselves were discussed and we saw how many of them grew in the hot-house and hot-beds. If more of our horticulturists realized how inexpensive a simple hot-bed is, and understood the care of one, many would indulge in them.

It was not altogether the knowledge we gained last winter that was of benefit to us, but we gained in enthusiasm and love for the work in horticulture. It means much to a student to be under instructors who are thoroughly interested in their chosen profession.

Perhaps it would be of interest to know a little of the influence the Horticultural school exerted last winter. During February a young man came to take a few weeks' work in landscape gardening. He attended the lectures on orcharding and small fruit and became so interested in the work that he stayed several weeks longer than he had planned for. After leaving the University he bought a farm which he is setting out to fruit. The only lady that took the dairy course came into the lectures the last of February and instead of the dairy farm she is helping in the work of a fruit farm.

Missouri is the first State to open a School of Horticulture in her Agricultural College, and the success of the school depends on the support given it by her people. When one sees the neglected orchards and the many farms without fruit for family use over our State he needs no farther proof of a need of such a school. And even those who

have had experience in horticulture cannot fail to receive great benefit from the work, in the broader view it will give them of horticulture and their own State.

EMMA J. PARK, Springfield, Mo.

STUDIES IN POLLINATION.

During the past two years the Experiment Station has been carrying on experiments to ascertain what varieties of our cultivated fruits are self-fertilizing and which ones need cross-pollination in order to produce fruit. While the work is only fairly begun, some points of interest have already been developed, and we are now ready to answer many of the questions that are sent to us concerning the possibility of self-fertilization in certain varieties.

First let us understand the terms relative to pollination and fertilization. The pollination of a flower simply means the act of placing pollen on the pistil of that flower. Fertilization (in the sense here used) means the action of the pollen which causes the fruit to set. Thus it will be seen that a flower may be capable of self-pollination without being capable of self-fertilization; that is, it is capable of self-pollination if it can transfer its pollen from the stamen to the pistil, but it is not capable of self-fertilization unless this pollen causes the fruit to set. It has been proven that in some varieties that are capable of transferring their pollen from the anther to the pistil, the pollen is not capable of germinating there and causing the setting of fruit.

In the peach orchard the following 24 varieties were worked upon: Hale's Early, Foster, Old Mixon Cling, Heath Cling, Wonderful, Family Favorite, Blood Free, Mountain Rose, Arkansas Mammoth Cling, Alexander, Rivers' Early, Old Mixon Free, Stump, Snow, Arkansas Traveler, Elberta, Crawford's Early, Smock, Crawford's Late, Silver Medal, Salway, St. John, Gold Dust, Piquett's Late.

All these varieties were found to be capable of self-fertilization and the self-fertilized fruit developed as well as it did where the flowers were left exposed to be pollinated by natural methods, and as well as any of the cross pollinated fruits did.

Only eight varieties of plums fruited this year, as follows: Lombard, Spanlding, Abundance, DeSota, Pond's Seedling, Shropshire Damson, Imperial Gage and Golden Beauty. All of these were found to be capable of perfect self fertilization.

Of the cherries, Ostheim, Early Richmond, Montmorency, English Morello, Leib, Olivet and May Duke were found to develop perfect fruit when self-pollinated, but the few self-pollinated fruits that set were small and dropped shortly before the ripening period.

Of the apples worked upon only two varieties, Fall Pippin and Peter Gideon's Best, were proven to be capable of self-fertilization. The following varieties did not set any fruit where their flowers were sacked, though they set abundantly where their flowers were left exposed: Babbitt, Gano, Gill's Beauty, McAfee's Nonesuch, Shackelford, Woodmansee, Sharp, Holman, Ben Davis, Lowell. It remains to be proven by farther experiment whether the failure of these varieties to set fruit in sacks was due to impotency of their own pollen or to the fact that some mechanical difficulty prevented their pollen from reaching their pistils.

The 110 varieties of grapes, embracing many different types, gave some very interesting results. The following fifty-six varieties form perfect bunches when self-fertilized: Wells, Niagara, Pocklington, Moore's Early, Potter, Hayes, Vergennes, Poughkeepsie Red, Eaton, Empire State, Centennial, Diamond, Highland, Delaware, Early Victor, Standard, Stayman's No. 15, Stayman's No. 18, Stayman's No. 44, Stayman's No. 47, Woodruff Red, Green Mountain, Transparent, New Haven, Mason's Seedling, Israella, Wyland, Lutie, Othella, Norfolk, Northern Muscadine, Herbemont, Catawba, August Giant, Ives, Jefferson, Janesville, Lady Washington, Montifore, Gambridge, Cynthiana, Perkins, Challenge, Mary Ann, Amber, Martha, Elvira, Rochester, Norton's Virginia, Telegraph, Requa, Noah, Rentz, Dracut Amber, Agawan and Etta.

Some varieties were shown to be barely capable of self-fertilization. While they set a few fruit in sacks the bunches were very imperfect, most of the berries failing to set. When left exposed to natural pollination they set much better. This list includes seventeen varieties, as follows: Worden, Jessica, Duchess, Stayman's No. 42, Lady, Bacchus, Wyoming Red, Diana, Conquerer, Hartford Prolific, Iona, Missouri Reisling, Pearl, Champion, Cottage, Hermann and Faith.

The following varieties were found to be incapable of self-fertilization, but they set fruit when planted with other varieties: Ideal, Jewell, August Giant, Brighton, Moyer, North Carolina, Herbert, Ironclad, Aminia, Jewell, Amber Queen, Lindley, Neosho, Rothwell's Seedling, Black Hawk, Salem, Green's Golden, Black Eagle, Taylor, Bullitt, Massasoit, Barry, Isabella, Eumelon, Wilder, Wilding and Marion.

The failure of different varieties to self-fertilize may be due to different causes. The pollen of some varieties is not self-potent—that is, though it reaches the pistil all right, it is incapable of promoting the setting of the fruit. In some varieties the pollen and the pistils are not ready for fertilization at the same time. The pollen may ripen too early, or, on the other hand, too late to impregnate or fertilize the

flower. Sometimes a mechanical difficulty stands in the way of the pollen reaching the pistil; that is, the stamens may be too long or too short, or, as is the case in many of the grapes, they may be curved back and downward, out of the way of the pistils. Nearly all of the grapes which were not capable of self-fertilization were found to have reflexed (curved backward) stamens. It is interesting to note that in a single row of grapes there were four or five vines together at one end of the trellis that had reflexed stamens. The vines nearest the end of the trellis and farthest from any other variety set fruit very poorly, while the vine next to another strong pollen-bearing variety set much more fruit.

In the case of the apples, it is probable that some of the varieties that did not set fruit in sacks may yet be found to be capable of self-fertilization if left open, where they may be freely visited by insects. The Ben Davis, for example, is known to have fruited well where isolated to a considerable distance from any other variety. It is proven beyond doubt, however, that the grapes which did not form perfect bunches of fruit in sacks will set much better if planted among those varieties that set fruit readily in sacks.

Steps will be taken next season to ascertain whether the failure of certain varieties to self-fertilize is due to the impotency of their pollen or to some difficulty in the way of its reaching its pistils.

J. C. WHITTEN, Professor of Horticulture, College of Agriculture, Columbia, Mo.

THURSDAY, JUNE 10, 9 a. m.

Meeting called to order by President Evans.

Prayer by Rev. Pearse Pinch.

The Secretary then read several letters.

ST. LOUIS, June 9, 1897.

Mr. L. A. Goodman, Secretary, Springfield, Mo.:

DEAR MR. GOODMAN—I am very sorry that the Nurserymen's Association conflicts in its dates with your horticultural meeting, as I was extremely anxious to visit both. So I must write what I would have preferred very much to say to your good members.

At the Trans-Mississippi Exposition to be held next year in Omaha, it is intended that there be a magnificent horticultural display, and I trust that Missouri will be ready to take her usual leading position. To the end that that be possible, arrangements need to be made early, and I trust that you may take some action looking toward such an exhibit at this meeting. Should it be possible to arrange a meeting of your executive committee soon, I should like to confer with you regarding the matter. I feel that the one way in which the West can particularly distinguish herself in this exposition is in fruits and other horticultural products, and by concerted action. We can surely astonish and please our visitors with our products. I am sure that Missouri can be depended upon, and wish to find out as to just in what manner.

Please discuss the matter as you have time at the meeting, and write me at your early convenience. I remember with great pleasure my visit to your meeting several years ago, and greatly regret my inability to come this time.

Yours sincerely,

F. W. TAYLOR.

WESTVILLE, CHARITON COUNTY, MO., May 31, '97.

Hon. L. A. Goodman, Westport, Mo.:

DEAR SIR—In looking over the Horticultural report of '95, I see a paper from "Sam Miller" about seedless persimmons. I have it from good authority that there is one on the farm of David Gooch, Roanoke, Howard county, Mo., another on the farm of John Bass, Galena, Stone county, Mo. (Wishing to aid the horticulturist I thought I would inform you.) Please send a copy of the Horticultural report of '96 to Westville, Chariton county, Missouri.

Respectfully yours,

P. S.—I would like to be with you at Springfield, but cannot.

Z. CUPP.

LANAGAN, McDONALD COUNTY, MO., May 10.

Can you give any information concerning evaporators? There are many advertised. Which do you think would be best for family use. I want to get one and I want a good one for as little money as possible. I think it will be good advertisement, as there is none in reach of us.

MRS. WM. RODGERS.

Answer—The Zimmerman.

ELSDON, P. O., CHICAGO, May 28, 1897.

DEAR SIR—Will you please inform me as to the prospect of the apple crop in Missouri this year; also in what county are the heaviest orchards. I am looking for a location for a cider mill and jelly factory, and want a good orchard country, and of course would prefer one where there is no other mill, etc. How would Springfield, West Plains, Willow Springs, Cabool, etc., or Monet, Sellman, Sulphur Springs, Ark., Siloam Springs, Ark., do? I understand there is a still at Bentonville, Ark., that uses apples. It is preferable to get where there is no canning or drying plant or distillery. How about Arkansas? There ought to be some good points there. Can you tell me where there are cider mills, canning factories, etc., located? It might save me going there later on, as I expect to run down and look the ground over.

Any information will be very acceptable.

Yours, etc.,

JOHN P. ANDERSON.

FARMERSBURG, IA., June 2, 1897.

L. A. GOODMAN, Secretary:

Do you know anything about the Phoenix apple? Last Christmas I ate some at Elkader, this county, and brought two home, they in good, sound condition at this date. The merchant that sold them does not know where they came from. There were two barrels in the lot. I want, if I can, to get some buds or trees to grow the apple, if I can get on the right track. Any information you can give me in relation to it will place me under obligations to you.

Truly,

JOHN E. CORLETT.

NOTE—It is probably Lawver—a good keeper, but cannot get enough

OLDEN, MO., June 2, 1897.

MR. L. A. GOODMAN, Westport, Mo.:

DEAR SIR—Can you furnish me a receipt for keeping fruits with acids? I want to put up some black and raspberries and early peaches for an exhibit in August. Kindly answer by return mail, and oblige,

Very truly yours,

S. R. HAMMOND.

COLUMBIA, MO., March 15, 1897.

The preparation that preserved the grapes so nicely and was almost as good for plums, peaches, apples and other fruits, is "Formalin," a preparation sent out by dealers in laboratory materials and reagents. On the grapes a two per cent solution was best for the varieties I tried it on. I shall try weak and stronger solutions from one to five per cent, and see which is best for the various fruits. It will freeze, so I shall try using it in salt water instead of pure water. I have tried fixing the fruits in the formalin and then adding a little alcohol to prevent freezing. That is pretty good, but the alcohol still bleaches a little.

Richards & Co., 108 Lake St., Chicago, can sell you formalin or formalose.

Very truly yours,

J. C. WHITTEN

REMARKS ON LETTERS.

Mrs. Moyer—I will say that a great many have visited at our place when we were running this evaporator of ours, and they say it is a most complete little affair for home use; they like it better than anything they have seen. The entire cost of it for lumber, material and making does not exceed \$5.

Mr. Barnes—I believe in encouraging all these implements and fixtures that can be made at home just as much as possible. I do not see any reason why we cannot make evaporators at home that will give just as good service. I want to speak just a few minutes of the evaporator used by Judge Welhouse, the apple-grower of Kansas. He said he tried one evaporator after another of the patented ones, and finally he paid a Mr. Plummer, a great evaporator man, to erect him an evaporator, and he says he used it for two years and then threw it away. He found out from some New Yorkers that home made affairs are better, and he is using one at the present time.

Take any kind of a clean building you may have already built, if you have one; his is 18 feet square, and the posts are 14 feet high, 14 or 16, as you like it, with an earth floor; around the sides are openings, 2 or 3 on a side, that can be closed at pleasure; on the cone of the roof is a ventilator, all the way along, so as to let out the steam from the fruit. Eight feet from the ground a slatted floor is put in; these slats are of two-inch lumber, and put in in such a way that when nailed down the upper side is about 3-16 of an inch apart, that is, leaves cracks about 3-16 of an inch wide, and the lower side a little wider, so that anything that falls on it will not lodge there, but pass through and not stop up the cracks; that floor is about 8 feet from the ground. Now, under that floor you can put in any kind of a heating apparatus and run up a brick chimney, or any kind you want, to run up through the middle or center of the building. A dryer 18 feet square will dry a hundred bushels a day of 24 hours.

Around the sides of the building, even with this floor 8 feet high is a sort of a balcony arrangement, and you can step in and out there in handling the fruit. Paring and coring and preparing the fruit of course is another department.

The apples, some of them, become what they call bone dry, and they will snap and break, become shrivelled in the heat; he has a process of putting them through water and steaming them and making them soft. He put up his dryer and sells his apples, under the instructions of a New York house. Year before last he hauled 26,400 bush-

els of appels from his dryer, and the New Yorker came out with nothing but a check-book in his pocket, and he bought those apples and took them back to New York in barrels and boxes.

Prof. Whitten—The question with regard to the gases for keeping fruit, so far as we are able to answer it, I can answer it approvingly. It occurred to Dr. Ayers that he might be able to keep apples from decaying by exposing them to the fumes of carbon dioxide. For this purpose he used some large glass jars; some of the apples were kept on the show tables until they began to rotten, some were put in jars with gas turned in and some put into a jar without the gas being turned in. Those that were in gas kept perfectly, except the carbonic acid gas would form in them, while in a very few days those that had not been exposed to the gas had decayed and putrified. After remaining in the gas for three or four months, the carbonic acid gas had formed on them, and they had the smell of vinegar, but there was no decay nor any putrifying indications at all. He thinks by further experiments he will be able to put apples in air-tight rooms and keep them by exposing them to that gas. This gas can be gotten and compressed in tanks quite cheaply. He said if he were going to try to keep them by that method he would take the apples when entirely good, before any of the tissues had been broken at all, or affected; these apples he did use were in different stages of decay, none of them were perfectly sound.

Certain it is any way that they will not putrify in that gas. The formaline for keeping fruit is just coming into use, and costs about twenty-five cents a pound.

We tried some experiments with it last year and we are also trying some this year; it is particularly fine for keeping grapes, and grapes will keep in that and look almost as natural as the day they were put in, for an indefinite period of time. On the second day of last July, I put some grapes in a solution of about one and one-half per cent, that is, one and one-half pounds to 98½ pounds of water, and put some grapes in that and today they have their natural appearance, in fact, in the liquid they look better than when dry in the air. I do not know how long they may last, but there is no reason why, corked and sealed up tight, why they shouldn't keep indefinitely.

This year we are trying all fruits as they come in, in different strengths of the formula. For instance, a strawberry, if put in two per cent solution will cause the color to come out of the strawberry, and in a one per cent solution the color does not come out nearly so much, not enough to speak of, and it is a question whether a solution weak enough to not take out its color will keep them from decaying. Strawberries turn a little and look a little bit brown and the color comes out

into the liquid, but not enough to do much harm. Cherries do not fade out at all. We put some in a two per cent solution and none of their color came out at all. We have tried it on plums and peaches; we put some peaches last August in one and one-half per cent solution and they still have the red cheek which is characteristic of the Elberta, the variety which we used. In using this, seal it with a cork and then put paraffine or vaseline around the cork to keep it from escaping.

Q. In what shape is this secured?

A. It is secured in a liquid form; it is a gas dissolved in water. It is imported and there are several firms from which it can be had. From Henry Hile Chemical Co. of St. Louis, the formaline or formalose, it is a forty per cent solution of the Formalid¹ Hyde.

Q. Has there ever been introduced in this section any device for picking fruit; if so, what?

Mr. Murray—I never heard of any kind of a patented fruit picker and I hope I never shall. This is the best picker known (extending his hand). The hands are the best fruit pickers there are. I want to see pickers employed in hand-picking.

Mr. Goodman—I wouldn't give a cent for a man that couldn't pick a hundred bushels a day with his hands; the hand is the best picker.

Mr. Miller—I am glad Mr. Goodman made the remark that he wouldn't give a cent for a man who couldn't pick a hundred bushels a day; years ago I picked 80 bushels one day, but I was ashamed to tell it, because I thought no one would believe me, but after I heard once of a man who had picked more than that I did not mind telling it, but I never told it until I heard of someone else.

Q. An insect is killing my trees, what is it?

A. Prof. Stedman—I think the gentleman must be mistaken; there is no insect on earth that will get into a tree and kill it in a short time unless the tree is a very small one and a seedling. He starts off apparently to describe the twig borer, but when he says it kills the tree he gives the impression that one insect does it, and I do not know what he has reference to, because it takes a great many borers to kill a tree. A twig borer does not go into the heart of a tree; a twig borer will kill a twig but it takes a great many to kill a tree.

DISCUSSION ON SPRAYING.

Mr. Moseley—The experience we have had in spraying with arce-nate of lead is that there has been no damage done at all to the foliage or fruit, and I am well satisfied that it killed nearly all the caterpillars. We applied two sprayings of the arce-nate of lead to the caterpillars; I only sprayed a little block with the lead, and I had to go

all over the orchard and pick out the caterpillars where we had not sprayed. We made an experiment last year with the Bordeaux mixture and we did not kill our trees or destroy a great deal of the foliage, but we injured the fruit. We were very careful and made that spray with formula No. 3 of the Bordeaux mixture and reduced it to a very fine condition, the finest condition we were able to produce, and we were very careful. The trees did not show any damage for some three weeks after the spraying was done. It was dry that length of time after the spraying was done. About three weeks after we had sprayed there came considerable of a shower and then the sun came out after the shower and about 30 per cent of the leaves turned yellow and fell off, and we damaged the foliage to those trees very greatly while we did not destroy it, and we also damaged the crop of peaches, they did not attain the size the others did. I am very much elated over the discovery of the arcenate of lead spraying; our peaches we have made experiments on this season are entirely free from any depredations so far and are growing nicely without any indication of damage done.

Mr. Stedman—Do you know what solution you used for the caterpillars?

A. Fifteen ounces to 100 gallons of water.

Prof. Stedman—The arcenate of lead was nothing that originated with me at all; it was discovered by a gypsy some years ago, and simply as a matter of experiment I tried it on the trees this year. In fact no one man did discover it. The beauty of it is that you can use it on the trees in almost any strength and not injure the tree.

Fifteen ounces of arcenate of lead in 100 gallons of water is equivalent to one pound of Paris green to about 150 gallons of water.

You will understand that it must be used in different strength on different trees. The arcenate of lead contains a little less arsenic than the Paris green and we have to use a little more in weight, but it has this advantage, aside from the fact that it will not injure the trees it requires less exertion to keep it suspended in water, while the other requires almost constant stirring and mixing.

Arcenate of lead has been demonstrated to kill any insects that eat, no matter what they are; but in some instances it must be stronger than in others. You use arcenate of lead the same as you would use Paris green, only you must always use more of it. Paris green costs in bulk about 19 cents a pound; the arcenate of lead is a little cheaper by weight, but inasmuch as you have to use more in weight it brings it up to about the same expense with this advantage that you do not need the lime with the lead. It is necessary to add a little glucose, otherwise the arsenic falls off the tree; but glucose is cheap, and by

adding a little of that I think it will stay on the tree better than Paris green and lime.

With reference to the curculio, we cannot reach it with any spray or with any poison; the curculio eats very little; theoretically, we could kill it if we could reach every particle of fruit; but that is impossible; we cannot stay upon one tree long enough to do that, and the result is if we reach 50 per cent of curculio we are doing remarkably well. The formula for the arsenate of lead is:

Arsenate of soda, four ounces; acetate of lead, 11 ounces.

That makes 15 ounces to be put in 100 gallons of water.

Put that into a bucket of water, dissolve it thoroughly and let it stand over night, and during that time the solution will be formed. It is possible to buy arsenate of lead in the drug store, but it is expensive, and it is better to make it as I have indicated. It will not kill a canker worm half grown, neither will it kill the curculio in many instances.

Mr. Moseley—I would like to know if there is any danger to human life or health in using this spray, that is, while using it?

A. It is just as injurious to breathe arsenate of lead as to breathe arsenate in any other form, but this is kept in water and you do not breathe it.

Mr. Evans—What effect will that spraying on the peach trees have on the bees?

A. That is like the question that came up yesterday about bees puncturing grapes.

It has never been satisfactorily demonstrated one way or the other. Some people claim that if we spray while the trees are in bloom that it will injure the bees. My impression is that there is no danger, and it is my impression that there is no danger in spraying trees while in full bloom; some think that by spraying while in bloom they ruin the bloom so that it ruins pollination.

Mr. Miller—This spraying has become a great affair; some recommend and some condemn it. I have used Paris green and London purple, and this year I have tried a new thing which is very simple; those chemicals are difficult to understand. A year ago I purchased some tobacco stems and some tobacco dust; I put about ten pounds of tobacco stems in a barrel and put in about a half a barrel of water; I took a bucket full of it that day—it was about the color of pretty fairly colored coffee—and I put this in twice the quantity of clear water, and I went out with that to my tree, not with a fine spray, but a fan spray, and I scattered that tree over and over and I think I hit every bloom, and I went over the whole row; and then a rain came and I was afraid it washed the most of it off, and I went out when

there was a slight breeze when the tree was damp and scattered that tobacco dust all over the tree. There is only one insect on earth that I know of that will willingly take tobacco in its mouth, and that is refined man; and if we can kill the curculio with tobacco tea, it will kill every insect and not hurt the tree at all.

Prof. Stedman—I have tried tobacco and carbolic acid, but have not been able to kill curculios with either one. The best results are from jarring, but of course that cannot always be done.

Now, about man being the only one to take tobacco in its mouth, the truth is there are about 20 insects that eat it.

Mr. Murray—I have had considerable experience in spraying. I want to give a little experience of spraying a plum tree with London purple. I mixed one pound of London purple with fifty gallons of water and four pounds of lime. I thought I would test that on the trees to see what effect it would have on the foliage, and among others I sprayed one plum tree, and I sprayed it thoroughly; I put on about two gallons of the solution, and it did not hurt the leaves at all, and I was not thinking about keeping the curculio off; I did it to test it as to burning, and I looked at that plum tree carefully before coming down here, and I brought a twig of that plum tree with me, and another tree standing near that; I think about one-half of the plums on it are stung. I have been told that it is no use to spray for curculio, but I am going to watch them.

Mr. Gilbert—I would like to ask the professor if it wouldn't be well to pound the soda and lead before trying to dissolve it?

Mr. Stedman—Yes, sir; that would do; the arsenate of soda and acetate of lead comes in lumps, and you can dissolve 15 ounces of this in a bucket of water in a very few minutes.

The curculio eats a little hole into the plum or cherry or whatever it may be, and deposits its egg in there; in doing that it has to eat through the surface of the plum and then eats a little crescent or circle around that egg, and in that eating is the only salvation in killing the curculio with the spray; with the gouger the chances are greater, for the gouger eats much more.

Mrs. Moyer—I would like to know what kind of a looking animal or insect this gouger is? This spring we have noticed something eating the little short twigs off the peach tree, and they eat some off until the limb drops off and we found a big bug there. The children call it a stink bug, and I would like to know what it is, for that is what is causing all the trouble. I would also like to ask if this formula you are speaking of will prevent the rot on the early peach and some of

the plums; we have a large Imperial plum that seems to rot each year. The Bordeaux mixture does not seem to help any.

Mr. Stedman—This formula will do no good; you will have to reach it by the Bordeaux mixture or something of the kind. This gonger we were speaking of is very much like the curculio.

Q. Can you mix the arsenate of lead with this Bordeaux mixture?

A. You can use the arsenate of lead just the same as if the Bordeaux mixture was pure water.

Mr. Murray—I think we have just about as many of the plum gongers as we have of the curculio; we have them both in my orchard and I know them both. Here is a twig of that plum tree I sprayed with the London purple, in the solution I spoke of a minute ago—one pound of London purple, four pounds of lime and 50 gallons of water. I am satisfied that the plum tree standing not over thirty feet from it has not one-half of its fruit perfect, and I am sure you cannot find an imperfect plum on this bunch of 26. I also tried it on other trees.

Q. Those curculios that deposit their eggs early and those plums that fall to the ground, will they have time to go through the process of germination and come up and sting them again?

A. There is but one brood a year.

Mr. Stedman—I would not advise any one to use London purple for the reason that it is the refuse of different dye-stuffs, and its character varies; if you should use it this year and be successful and try it again next year you might ruin your trees, because you might get it of a different strength or quality, and so I would not advise its use, or if at all, only after it had been tested very carefully.

Q. Are grapes stung by the same insect?

A. No, sir, by an entirely different insect.

Mr. Haseltine—I would like to know if there is any mode of spraying, or anything that has any effect on bitter rot?

Mr. Whitten—Bitter rot has been reduced somewhat by careful spraying; a number of people who have tried spraying for it have reported a certain per cent of benefit from the spraying; there is no way of absolutely preventing or curing bitter rot. You can reduce it somewhat. Bordeaux mixture has given the best results by spraying early in the season.

And then right through the ripening season to spray with potassium sulphide we have found it quite effective. You will notice it grows less and less each year under this treatment.

DISCUSSION ON INSECT PESTS.

Q. I want to know something of a bug that gets in the potatoes. It is a worm that gets in the stem. They got into some very fine ones I had and destroyed about half of them. It is about one-half inch long and has a white stripe down its back.

Mr. Stedman—That is by no means a new insect. My attention was called to it by someone writing me a letter. It has occurred in the east in great quantities in certain years and has done great damage, but it is easy to fight. We cannot reach it by spraying, as it does its work entirely inside. If you will cut off the stems early and not allow them to die down and wilt, and if you will cut them off and burn them you will get rid of them. They have done that in the east and have had no further trouble whatever. You wait until the tops would die and the potato is ripe and pull them up and burn them and you kill every one that is in the field. Right the present time you can do nothing, but you can prevent them from coming another year.

While I am up I will speak of this twig some gentleman handed me with a row of eggs upon it. That is a very common thing. They are sent to me at least three a week by parties wanting to know what they are. In the winter some people took them for the San Jose scale, and they have taken them for everything. Those are the eggs of the katydid. You will find them upon the twigs during the winter. Do not be afraid of these; they will not do you any injury—not because they are not capable of doing injury, but because there are parasites that hold them in check.

Mr. Van Houten—We live in a potato growing country, and two or three years ago those bugs were so prevalent we began to hear that one of the chief industries was ruined, but the fact that we have been shipping potatoes this year at 6 cents a bushel shows that our industry along that line is not ruined by any means, and the trouble from them with us was very short.

Mr. Murray—I want to make a statement so that Prof. Stedman can give us some information in regard to the canker worm. This spring a year ago it appeared in several orchards, mostly in old orchards, one orchard of about thirty acres was entirely denuded of fruit within a few days; a good many of us sprayed; there were a few canker worms appeared in our own orchards. This year while we are not seriously troubled with canker worms, they reappeared in that same orchard and in a good many orchards, and I know it was on account of canker worms that a good many resorted to spraying; I advised that and kept posted as well as I could, and got information from Prof. Stedman, for

which I am very thankful, about the strength of the solution. I got information from one man that he had sprayed with London purple—or it might have been Paris green—and that he had exterminated the canker worm; what I want to know is whether or not it would be practicable to spray at any time? Whether or not they wouldn't be so numerous they would destroy the foliage before you could conquer them? While the canker worm is increasing so rapidly what can we expect next year?

Prof. Stedman—I presume it would be just as well if I gave a very short history of the canker worm so you will know why you are doing certain things. There are two species of canker worm, and they are much alike, the only difference practically, being in the life history of the two: one appears, as a rule, in the adult condition in the fall, and the other appears, as a rule, early in the spring. Sometimes the one will appear at one time and the other at another. In either case the female canker worm has no wings; it is a moth and should have wings, but apparently has not. The male has two pairs of wings and flies about. Now, that female, when she hatches out is somewhere besides on the tree, and in order to lay her eggs she has to climb that tree, and she will climb up that tree and deposit her eggs on the limbs. If she is hatched out in the fall her eggs pass the winter, if in the spring they will develop late in the season.

Now in order to get in the tree she has to climb up, having no wings she cannot fly, and if you will place some kind of a barrier around that she cannot pass that barrier and cannot get into the tree to deposit her eggs and will deposit her eggs in the grass where they will perish. We have a spray for the codling moth and other insects, and with it reach a number of those canker worms, but it has to be a much stronger solution of Paris green for the canker worm than for the other insects. Now when these larvæ hatch they do not hatch until spring, they begin to feed rapidly upon the leaves of the tree and they keep those leaves eaten down and keep the tree from leaving out properly, and sometimes in a few days they reach maturity. I am under the impression it would be just as well if we went back to the old method and put bands around our trees where the orchards are infested, for the simple reason that we do not spray thoroughly, and therefore we are not going to reach such ravenous feeders as the canker worm, and it requires—except in the very early stages—a much stronger solution. You can put a band of tin around the tree just a short distance above the ground, or you can take a band of cotton wool, not the smooth cotton batting, but the cotton wool that is fluffy,

and tie that around the tree and let it fall over where it is tied and it forms a loose, fluffy band and the moth cannot crawl over that on account of the fibres, neither can she pass over the tin.

Q. How would it be in a rain and after this cotton gets packed could they crawl over it then?

A. They probably could.

Q. Mr. Murray—What time would you put it on?

A. The female of one species hatches out in the fall and deposits her eggs, and another in the spring.

Q. Then you have to put it on in the fall and in the spring?

A. You could leave it on all the time, but cotton soon packs so it is better to put them on twice a year; tin is better because you can put it on so they cannot get around; this spring some of the canker worms hatched out as early as February.

Q. Mr. Everington—What do those young feed on?

A. The female climbs up and lays her eggs, and they hatch out about the time the leaves come out.

Q. What may be expected of an orchard that has been infested with canker worm this season and defoliated? Will it bring a crop of fruit next year?

A. If you keep the canker worms away, yes, sir, decidedly; sometimes they disappear entirely, but that is due to parasites.

Q. President Evans—Have you an idea what area of our State has been infested with canker worms this year?

A. I have not mapped it out yet, but I have all the information on file so I can say, I should think, about one-third of the fruit-growing region.

Q. What would be the average destruction in each of those counties? what proportion of orchards have been destroyed in the counties that are infested?

A. About one-sixth.

Q. Mr. Hopkins—Suppose they are not destroyed and reappear for two or three years in succession and destroy all the foliage, won't that kill the tree?

A. No, the tree recovers so far as the leaves are concerned, but you lose your crop.

Mr. Hopkins—Last year the canker worm appeared in an orchard of Dr. Ullman's, and I desputed it being a canker worm, because of the fact that I had never seen it at that season of the year.

Mr. Stedman—One specie is much more familiar than the other, and that was the specie you was not familiar with.

Q. Mr. Murray—I would like to ask one more question, whether or not, from your information and best experience, can we reasonably hope that some parasite may check it by next year, or whether the chances are in favor of an increase of the canker worm next year?

A. Yes, sir; we have about five parasites we can rely upon, and in certain localities those parasites will probably exterminate it, so far as we are concerned. It may do it next year, or it may not—it depends upon conditions; but it is a very common occurrence to have it do so.

Mr. Stedman—Here I hold up a twig with something on it; it is called the praying mantis or devil's horse. That is one of your most beneficial insects; it prays upon other insects. If we had enough of those insects it would exterminate the canker worm; one of them will kill dozens in a day. Observe those eggs, and do not pull them off your trees and burn them; they are your friends. There is one thing I wish I could impress upon all: we have insects that are beneficial as well as ones that are injurious; that insect derives nourishment by sucking the juice from other insects.

Q. I noticed in my orchard small patches of eggs about like a thumb nail; do you know what those eggs are? They are deposited something like the back of a tortoise shell. They are of yellow color covered over with a kind of slime; they come early in spring and late in winter, and in the summer you will find the shells.

A. No, sir; that is not an injurious insect; we have no injurious insects that do that that lay their eggs in the winter, but I do not know from your description what they are.

Q. Tell us how to fight the ten caterpillar.

A. One way is to go around to the trees and take a stick and put in and turn it and put it on the ground and step on it; if you wait until later you can go over the orchard with a torch and burn them; that is not injurious to the tree at all; or you can spray it if you spray while they are very young.

Mr. Murray—I would like to inquire about the green aphid; there was so much excitement about it in the spring; I would like to know what success has been made in destroying it.

A. Those aphid, it does not matter what color they are; they are the same insect. Those insects at certain seasons, if the conditions are just right, they multiply enormously without laying eggs. They do that so rapidly that as soon as the trees unfold their leaves they are covered with the aphid; those insects do not ordinarily do much damage; the only damage they do is certain years upon cherry trees and plum trees; they rarely damage apple trees.

After being on the tree and sucking the juice for a few weeks they leave the trees and migrate to the grass and stay there until fall, when they migrate again to the trees and lay their eggs.

When they appear, if you will spray with kerosene emulsion, I think one emulsion will be enough, sometimes they require two; or if you have a large orchard and want to get through with one spraying take pyrethrum and put it in your kerosene emulsion, and one spraying of that nine times out of ten will prove sufficient.

Mr. — I want to say a word in regard to my experience with canker worms: I tried tying rope around and it did not seem to keep them off, they would seem to paste that over with a sort of paste they have and walk right over it; and I tried putting tin around, I had two two inches wide around the trees and they would do the same with it, just paste it over, and walk right over it. And then I took cotton batting, the ordinary cotton batting that they use on quilts, I would open that out and put the smooth side next to the tree and tie that around in the middle and let the upper piece fall over, and they would try to get over that but they couldn't do it, and they would get tangled in it and would work here for two or three hours, then in the evening when it would get cool they would crawl up under that and I have found as high as fifteen that way on one tree; it is a regular trap for them.

The first we found were in January and we put that on them. After the second year we did not have any trouble with them, that completely exterminated them.

REPORT OF SECRETARY.

The interest in fruit-growing is on the increase sure and safe in all parts of Missouri, more truly now than at any other time in her history. The prospect for this year's crop is a good one—in fact, was never better in the history of the State. The crop last year, although not satisfactory in many particulars, brought a good many dollars to our pockets.

Seasons, times and surplus in the East destroyed the value of our apple crop, and on top of it all came the failure of our cold storage plants to properly keep the apples in their houses, all tended to lower and destroy values, and thousands of barrels of apples were not only lost, but cost their owners money besides, an anomaly in the history of orcharding in the West.

But, while last year the wet weather destroyed or injured our strawberry crop so that it did not pay in many instances, yet this year the cool dry weather has given an opportunity to market perfectly one

of the best and most profitable crops of berries that we have had in many years.

ORCHARDING

Is a great big question. It is a word that has not been known in its full meaning until of late years, and especially so in the West. Not many years since if you had told a person that you were going into the work of "Orcharding" he would hardly have known what you meant. Today we have hundreds of men who are "Orcharding" in the truest and fullest sense of the word. Years ago a person would have been thought wild who would plant an orchard of 100 acres. Today we find them by the hundreds over our Western country and many another who is planting 300 acres, 400 acres, or perhaps even 1,000 acres. Now we are no more astonished when we hear of some one planting two or three or more hundred acres of apple or peach orchards. The man now seems to go into it as a sort of business just as any other business man goes into his business.

This matter of "Orcharding" has also become a favorite and sure plan for the investment of a few hundred or thousands of dollars for safe keeping and sure returns.

No person can make a mistake in purchasing the cheap lands in Missouri all along our creeks, streams or rivers, where they are now mostly covered with a forest growth. Take these lands and chop, clear, burn off the brush or timber and plant to orchard trees. No person need fear that the cheap lands of Missouri will ever be any less in price than at this very time. Careful selection of some of these lands for future orchards and prepared in the proper manner for orchard growing will bring their owners two, three, five times the money spent on them if it be done in a legitimate manner and planted with the proper varieties. These cheap lands will be worth in a few years threefold the purchase price, and if planted in orchards will pay a wonderfully big per cent on the investment.

"Orcharding" means in its broadest sense the growing of apple orchards, pear orchards, peach, plum or cherry orchards in such quantities as to make it a business for the person who undertakes it. The orchardist should be a grower of all these fruits, so that he can supply his customers with what they want and when they want it. He will have a sufficient quantity of apples so that he can supply firm with a lot of apples every week during the winter, and, if possible, far into spring.

APPLE ORCHARDING

Means then the growing of quantities of apples for the wholesale buyer, or the dealer, or the grocer, or the family, or all combined. He wants

then, first, a proper location, suitable soil, the right climate in order to attempt the growing of apples in a commercial way. You will find this in nearly all parts of Missouri. Right about here you find the right elevation above the sea, 1,200 to 1,500 feet, and the correct location, where there are plenty of valleys to draw off the cold air and protect the fruit from destruction by late frost in spring or severe cold of winter.

Here you will find the suitable soil that gives the best of color, the choicest in quality, the finest of texture and the greatest in quality of any of our apples, of any place in all this broad land of ours. Missouri offers untold advantages to the one who will go up and possess them. Here you will find the most desirable climate for the production of these fruits in abundance, perfection and beauty.

The elevation, the location, the soil, the climate, then, are what we want, and if this soil of Missouri, that is so rich in all tree growth material, in the iron that colors the fruit, in the potash that makes the wood, then we need not fear to so locate, so plant, so cultivate and so gather of these beautiful and pure and good fruits, that it will gladden the heart and give health, and dollars will line the pockets of the apple-grower.

I shall surely congratulate the Society on its enthusiastic will to do. It is because of this powerful will to do that has given us such success in all our society work, in all the orchard development, in all our individual work. It is a long step, a broad river, hard trials, uphill work between the can and will. There is no responsibility rests upon us if we can not, but there is a sad one to us if we will not, and how many times we excuse ourselves and say can not when we simply mean will not.

As members of this Society we find few who will not, when any duty is placed upon them, and to that is ascribed the success of our Society and its work. You are noted among men for the success and the energy and the earnestness you have put into this society work in years past. People have looked and wondered and admired this work and this influence of yours for these many years, and the answer has been and will be that it is because you will.

This will of these, our members, has given us the power to overcome all obstacles; this is what has made your life a success, and is what will make any one's life a success, and will make any society a success. Success looks easy to us when we see the person at the end of a successful life or business, and we often think if we only had such an opportunity, or such advantages, or such circumstances as that person had, we also could be successful. The story seems so easy and

plain after the race is run and the history written, but the future seems so uncertain that we can see nothing but failure, or trouble, or hard work, or harder times in front of us.

So with this Society. It has been a long pull, but there has been a will that we succeed in spite of all the obstacles, and so it has. The prevailing rule of success has always been and always will be: "Do well all the duties of today" and you will be ready for the larger and greater duties of tomorrow. This rule gives such a discipline to our minds and body that the will to do becomes energy and push, and perseverance, and enthusiasm, and finally, success.

What we will do individually may be to follow somewhat the plan that we have always followed in all our business, a steady, earnest, continual at it. Today we find one thing succeeds best, tomorrow another, this year one variety or one class of fruits may be our success, another year we may find that the same fruit or vegetable would prove a failure; today proves one fact, tomorrow disproves it. Seven years ago I advised a friend to plant out 40 acres of apples and 10 acres of peaches, last year if his trees had all been peach, he said he should have made enough to pay for the entire place. One year I had such a bountiful crop of pears and secured such good prices that I wished all my trees were pear trees. But a few years later the pear trees all blighted, and perhaps next year my friend may have no peaches.

What we must do is to plod along with the best knowledge we can obtain each year, and profit by it, do the best we can, every duty and every work thoroughly and the will to do will make the success a sure one.

In spite of the wonderful success of special crops at certain times it is not wise to go too largely into any one thing exclusively, because if a failure comes it will be our all that fails. Better have the will to do a little of all things that can be done well and without conflict. All kinds of small fruits and large fruits that succeed well and will give employment the whole year round seems to be the safe and sure one to success. If you have the will to do you need not fail.

Today we complain that no money is to be made in many lines of business, and we wonder if ever we can realize the good old times. We fail to read the times if we expect such a thing. Things are changed, people are changed, times have changed, business has changed, all our surroundings have changed. Hundreds are doing today what one was doing years ago. Thousands were making money then to where we find tens doing it today. Tens of thousands are seeking employment today where only hundreds were, in the olden times.

Money was made easily then and spent freely, we became extravagant in the use of money and time, and can no more expect such things or times.

I wonder, when this subject comes to me, "what we will do," if we are as slow to learn of this change of times, and seasons, and customs, and business, as were the people here at the close of the war. I wonder if we begin to understand that we must adapt ourselves to this new order of things, and do twice the amount of work for one-half the pay. If not, then we fail to realize the questions, and times, and demands that are staring us in the face.

When I located at Westport, over twenty-five years ago, there came to my grounds every day an old gentleman (riding upon his little pony), of the times, and customs, and manners, and business of before the war. He looked on in disgust to my planting berries, and vines, and trees, and evergreens, and his continual advice to me was that "you will never make a cent out of all this work and nonsense. I have been here forty years cutting down just such things as you are planting. Go and raise hogs and mules, and cattle and corn." He never came to realize, to the day of his death, that it was a new era of things, that the old times had passed way, never more to return. He died mourning the good old times, and was continually repeating that town, and country, and people were going to destruction as fast as possible.

So, I think, when we hear the complaints and fault-finding, and recurrence to old times, and old prices, and old profits, and old successes, if we are not as blind to the changes of our times as was that man and those people, to the changes of the times at the close of the war in many parts of our State.

What we *will* do is to take these questions, and times, and seasons, and changes, and go at them with the same vim that we did ten, fifteen, twenty or twenty-five years ago. What will we do? Ask the young man of twenty or twenty-five years. He never grieves over old times, but with all his energy, and earnestness, and enthusiasm, he works with consciousness of nothing but success.

What we will do as a society will depend upon what we do individually. We surely cannot make the Society a success if we are not individually a success, for the whole cannot be greater than all its parts.

I feel sure in the prophecy when I say that this Society will continue its work in the future as in the past, in awakening this western country to a realization of its advantages for horticultural pursuits. I look to see this Society send out a good entomologist, or botanist, or

geologist, or chemist, or horticulturist, to occupy a prominent position in the land, and to help make the influence of our Society felt, and appreciated, and honored.

I look to see this Society take possession of the different horticultural organizations of the State. We will have our Society represented in the colleges of Missouri, Kansas and Arkansas. We will be the foremost in the future as in the past—first in horticulture, first in the sciences, and first in the application of all these to the use of our countrymen.

SCHOOL OF HORTICULTURE.

One of the most important steps for the advancement of the knowledge of horticulture was the establishment of this "School of Horticulture." It was my pleasurable duty to meet this class of eight and give them some instruction in the growing of orchard and small fruits. I went to Columbia and the Agricultural college with some misgivings, although I seldom undertake anything with that feeling; as to the result, it was an agreeable surprise to me when I found waiting there these earnest young people ready and eager to take all the information they could get and make it part of their own.

I found that Mr. Murray had given them a good start and had them well enthused on this subject of nursery growing, grafting, propagating, etc., so that my work taken up here carried them on to matters of greater interest and greater importance, if one fact can be considered greater than another. The work alone by these young people lead me to believe that much good will come to them and the school by this course. I look to see 40 there this next winter, each trying to get something out of this school that will make him or her a practical fruit-grower or a successful gardner.

The work consisted of discussions and illustrations, and facts given as concisely as I could give them, so that they could comprehend and grasp it all. I often thought that there was a great deal of detail work that need not be outlined or explained, but invariably it came to the point where it became necessary to go still into minute detail and explain every step in the plan. To this instruction was added three times each week some out-door practical application of the instruction in the pruning the grape, peach, pear, apple or berry bushes, or the planting of the same, or the propagation of plants might be the topic of discussion and the illustration was part of the practical work.

At the best I found myself enjoying every moment of time with these young people and thought myself back to the school life once more. I believe I am safe in predicting a large and successful school for the future.

The following are the list of students who followed the course entirely through, or nearly so: Miss Emma J. Park, Springfield; Paul Simmons, Macon; Cad Todd, Sedalia; W. B. Hoag, Mt. Grove; P. K. Sylvester, Osborn; A. W. Davis, Shelbina; L. Winchester, Sikeston; Arthur Erwin, Fulton; Mrs. A. C. Steibel, St. Louis. Besides these regular students we had often the class in Agriculture for a day's lecture or for a day's practical illustration.

OUR LIBRARY

Has been increased by the purchase of a number of new books, forty in number, at a cost of \$65. This library now contains all the most important books that are of interest to the fruit-grower and will be added to as the new works come to hand. I have used this library as a circulating library whenever called upon to do so. Many of our members have called upon me for help and I have sent them the work that would give them the best information, with the request to mail it back to me as soon as it was possible for them to do so.

This library and the file of State horticultural reports of other states give a vast amount of proper instruction that is invaluable to anyone who grows fruit.

OUR APPROPRIATION,

As many of you know, was increased by \$500 per year through the liberality of the General Assembly and the active work of President Evans, Vice-President Murray and Treasurer Nelson, and above all, through the influence of our local societies, and the wonderful interest awakened by the development of fruit growing all over our State by the members of our State Society.

I am glad that the importance of horticulture to our State has received such recognition as it justly deserves and such encouragement as it rightly needs for its fullest development. The printing commissioners have given us 500 more copies of the report for the year and they can be used to good advantage. We want gradually but surely to grow and develop and improve so that this growth may be a sound and substantial one and not one that can be overturned easily. Step by step and little by little have we desired to increase the usefulness and power of this Society and its influence all over our State.

OUR SUB-STATIONS.

Perhaps some of you noticed the item in the St. Louis Republic that Illinois had five sub-stations under the control of the State Society, and wondered why this State Society did not do likewise. In

answer I want to say that we have a number of men who are every year carrying on as valuable a series of experiments in the different departments of fruit, vegetable and flower experimenting as are those mentioned, and their results are published in our State report. These experiments and experiences are all the more valuable because they are made for a special purpose, to prove the value of special varieties on certain soils and locations. Hundreds of men, scattered over the State, are doing today what these sub-stations should be doing, and these results are so definite and sure that you have only to ask them the best varieties and soils and locations for making money and they will tell you, and best of all, these results are in shape in our report, so all may profit by them.

But this experimenting is an expensive matter to each of us, and although we reach conclusions that are safe and sure enough for us to follow, yet all this should be done by the Experiment Station as a center and four or five sub-stations as assistants. Such a complete and concise statement of facts could be collected and sent out that it would be very nearly a correct guide to follow.

THE EXPERIMENT STATION

Is now doing the best work ever done for the horticulturist, and outlining a lot of work for the future that will be very valuable to every fruit-grower. The sympathy and assistance of Prof. Waters and the efficient work of Prof. Whitten and Prof. Stedman will surely place our Station second to none in the land, instead of at the end, where we have been so long. Let us give every encouragement to them in their work and every assistance in carrying out their instructions.

HORTICULTURAL INSTITUTES.

It has been long the desire of this Society not only to co-operate with the State Board of Agriculture in the holding of institutes, but to hold a number of them itself. There are many points in our State where the principal interest is that of fruit-growing, and we have calls every year to come and hold an institute for two days at certain points. The increased appropriation now enables us to do so, and in fact I may add was made so that this could be done, and it was mutually understood that it would be done. A number of places have already made application for such an institute, and others will follow. As these come up and we are called upon to do a part in carrying our work on, let us do it with the same will and enthusiasm that we do all our business matters.

THE SHIPPERS' ASSOCIATION.

This disposition of our fruits has been and ever will be a great question to solve, and today it is the great bugaboo. There is no more serious or important question can come before this Society than that of "Transportation" and "Marketing." One has truly said, "It is no more a question, can we raise fruits, but how best to market them." What with enormous freight and express rates and dishonest commission men, the grower is between the devil and the deep sea. This union of communities and shipping in car lots is one answer. This shippers' union and their sending where the fruits are most wanted is another solution; this sending a man to the most important markets is another solution; but even then we are more or less at the mercy of the commission man, are we not? How can we best overcome that? Can men be found who are honest? Can it be possible to have an inspector at all our important points and commission men in all our cities, all of whom shall be under bond? If so, will it not be another way out of the difficulty? A full and free discussion of these matters should surely demand a part of our attention and discussion. Can we expect to succeed at once? By no means. It may take years to get the proper machinery and plan to work this to perfection. To any of you who think it cannot be done I would recommend a thorough study of Prof. Langley and his ten years' work on the flying machine.

THE COLD STORAGE

Was so nearly a failure last year that we have to question if they know it all yet. It occurs to me that they even have much to bear, and the only trouble is that they are learning at our expense. Thousands of pounds of good winter apples were put into cold storage last fall that were a complete loss, and the fault was not always the apple-packer's either. Good, large, cool cellars must help us solve the question, and it well behooves us to do much of this on our own plan.

These are only a few of the important matters that come to me as I study this great question. It is for you and me to take hold of each as it confronts us and help solve them. You need not fear that you will have nothing for your head to do when you begin to realize how much there is yet to study and learn and prove. To this end let us labor, and work, and wait, and watch, and in the end we will see success within our reach.

L. A. GOODMAN.

REPORT OF TREASURER, A. NELSON.

1897.		EXPENSES.	
Jan.	27..	Express, \$1.10, 30c, 50c, 40c	\$2 30
	27..	Salary of Secretary, January.....	66 66
	27..	Trip to Joplin, \$8.10, hotel, \$2.	10 10
		Warrant No. 354.....	
			\$79 06
Jan.	24..	Hudson & Kimberly, letter-heads.....	28 45
	24..	A. Nelson, trip to Kansas City, telegram	21 90
		Warrant No. 355	
			50 35
Feb.	23..	Hudson & Kimberly, \$4.25, express, \$6.50.....	10 75
	23..	Salary of Secretary, February, \$66.66, dray, \$1	67 66
		Warrant No. 356.....	
			78 11
March	23..	Express, \$2.85, P. O. bill, \$10	12 85
	23..	Salary of Secretary, March.....	66 66
		Warrant No. 357.....	
			79 51
	31..	Express, \$1, Scofield Ptg. Co., \$4.45.....	5 45
	31..	K. C. paper house, wrapping paper	9 85
	31..	Hudson & Kimberly, \$10.50, typewriter three months, \$60	70 50
		Warrant No. 358.....	
			85 80
	31..	P. O. bill, \$15, trip to Jefferson City, \$8.55	23 55
	31..	Hotel, \$4, library books, \$65	69 00
		Warrant No. 359.....	
			92 75
	31..	A. Nelson, expenses to Jefferson City, January.....	22 65
	31..	" " " " " " February	23 75
	31..	J. C. Evans, " " " "	12 00
	31..	N. F. Murray, " " " "	22 50
		Warrant No. 360.....	
			80 90
April	28..	Five hundred P. O. cards and printing	6 50
	28..	Spray pump (extinguisher)	10 00
	28..	Salary of Secretary for April.....	66 66
		Warrant No. 361	
			83 16
May	18..	J. M. Stedman, expenses	28 10
		Warrant No. 362	
			28 10
	27..	P. O. bill, \$10, receipt books, \$2.25	12 25
	27..	Program summer meeting	12 50
	27..	May 6, expenses to St. Louis	5 50
	27..	Hotel 11 days, \$11, return, \$9	20 00
	27..	Salary of Secretary for May	66 66
		Warrant No. 363.....	
			116 91
	27..	Hudson & Kimberly, 8 half tones and 4,000 impressions each for report	81 50
		Warrant No. 364	
			81 50
June	5..	P. O. bill and trip to Springfield, A. Nelson	6 60
	5..	Cash to Samuel Miller.....	15 00
		Warrant No. 365.....	
			21 60
		Balance on hand.....	\$77 55
			\$89 84
			1,766 94
RECEIPTS.			
Jan..		Balance as per last settlement	357 69
	27..	Received from State Auditor	797 97
	27..	Membership, L. A. Goodman	10 00
	27..	" " A. Nelson	18 00
March	31..	Received from State Auditor	546 28
	31..	" " " " deficiency bill	37 00
			1,766 94

SPRINGFIELD, MO., June 9, 1897.

We, the Committee on Finance, have examined the report of the Treasurer and find same correct as stated by him, and vouchers for all. Amount money on hand in bank of Lebanon, as stated by the cashier, \$889.39.

S. W. GILBERT,
N. F. MURRAY,
JOHN T. SNODGRASS,
Committee.

Mr. Zink, President of the Greene County Horticultural Society, then extended to the State Society an invitation to adjourn to the banquet prepared by the ladies of Springfield.

The President announced that the banquet prepared by the Greene County Fruit Growers' Association for the entertainment of the visitors would be ready in the old postoffice arcade about 12:30, and all members of the Convention were cordially invited to take dinner with the hosts of the meeting. The dinner was served at the appointed hour, and a more attractive dining-hall never greeted a company of visitors than the Springfield and Greene county ladies had prepared for their guests. The tables were charmingly decorated with flowers, and the aesthetic attractions of the banquet would alone have been a delight, but these beauties of the season only served to flavor the elaborate menu which the excellent housekeepers so generously served. The Greene County Association in this feature of hospitality certainly gave every guest a new appreciation of the rich resources of the Ozarks and the royal spirit of the Southwest Missouri heart.

After the dinner, Dr. Joseph Hensley, as toastmaster, called the meeting to order, and, making a few suitable remarks, introduced G. H. Van Houten, Secretary of the Iowa State Horticultural Society, who spoke very eloquently on "Horticulture in the East."

Vice-President N. F. Murray responded to the toast, "Horticulture in the West."

W. H. Barnes, Secretary of the Kansas Horticultural Society, spoke on "Unity in Horticulture," President J. O. Evans on "The Ozark Region," H. Adkins, of Searcoie, on "Three Hundred Car-loads of Strawberries," and Rev. John Brereton on "Women in Horticulture."

The miscellaneous program of the closing session was then taken up by the regular meeting.

THURSDAY, 3 P. M.

QUESTIONS AND ANSWERS.

Mr. Hartzell—The best fertilizer for the orchard is ashes. Ashes are good and are easy to procure. If a man can't get ashes he can get the concentrated lye.

Mr. Evans—I want to tell of one thing that every farmer can get, and that is cow peas. Of all the fertilizers we have experimented with the cow peas are the best we can get, so far as their value for a fertilizer is concerned.

Q. When shall we plant ?

A. Plant in the fore part of May and the latter part of June; then plow down and grow again; that is good treatment for an apple orchard. If your land is in moderate good condition for an apple orchard, sow your land in cow pease in June, and that will be all that will be necessary, and in the fall turn your hogs in and they will get fat. Plant your cow peas and turn your hogs in and they will trample it down, and in June plow it up and turn your hogs in again and your orchard will increase in fertility each year.

GRAFTING PEAR ON APPLE ROOTS.

Mr. Goodman—I would say that I had tried grafting pears on apple roots in a good many instances, and have budded the apple trees with pears also, and got a large growth of pear trees, and a good many I planted and a good many I sold. They will hold for a good many years if the union is planted below the ground, but if it is not they will break off. You will get probably 10 or 20 per cent out of the grafting of pear on apple roots.

Q. I would like to ask a question on that point. Will the woolly aphid attack the pear grafted on the apple root ?

A. The woolly aphid will attack the apple root no matter what the top is.

Mr. Wiley—I will give my experience along that line. It acted similarly to the Chinese stock. The trouble with the Chinese stock is that the sap rises in that stock much sooner. I would prefer the apple seedling. I found that after they had been growing for two or three years they established their own roots, and then they become a good pear.

Mrs. Moore—How would you set the pear grafted on the apple ?

A. Just as deep as on any other; make the graft quite low down; there is a very small per cent of the grafted fruit that lives; it depends a great deal on the variety.

Mr. Zink—I would like to ask if Mr. Wiley has ever used the Leconte root as a stock grafting?

Mr. Wiley—I have and cannot say that I see any difference.

Mr. Zink—Grafted on the Leconte root it will not grow well and be healthy.

Mr. Goodman—I want to say that at Olden about 2,500 Leconte roots were grafted upon, and out of the twenty-five hundred grafted upon nearly every one died; they never paid for the trouble.

Q. What is the objection to a Japanese plum grafted upon peach stock?

Mr. Miller—I would say nothing if you plant it over the joint.

Q. What is the effect of spraying the apple in June and later?

Mr. Whitten—We always spray the apple a little later than June for the scab and ordinary fungus diseases; we spray up until July and sometimes up until the gathering season almost. If apples are sprayed up until nearly the gathering season with Bordeaux mixture and there is no rain, it is apt to discolor the fruit. We never had any apples discolored at gathering time if they were not sprayed later than within six weeks of the gathering season.

Q. How late should spraying be continued if fruit is healthy?

A. For scab, skin blotch and leaf rust, which occurs in the districts where cider apples are prevalent, that spraying up to the first or middle of July will be sufficient to keep those off, but in bitter rot you want to spray right on until nearly time to gather the fruit.

It is somewhat expensive, but you can make the spraying less and less each year; where we have gone right on spraying for three or four years we find now that we do not have to spray more than two or three times a year in order to keep scab and skin blotch all off.

Q. What kind of a cellar is the best to keep apples for family use?

Mr. Miller—A deep clean one, with a contrivance to keep open and ventilate in cool weather.

Mr. Whitten—I think one with moisture is good so they will not shrivel.

Q. What is the best storage for apples?

Mr. Goodman—I wish to say in connection with this that our cold storage plants are partly a failure. There were hundreds of thousands of barrels of apples put in cold storage in large cold-storage places in Kansas City, and thousands of those barrels were lost absolutely. We were looking for a few barrels to send away to a foreign country, and we couldn't find them that were fit to send, and those very men who

have always asked that the fruit men would take advantage of their offers to take care of the fruit do not know what to do.

Mr. Hartzell—I want to say that in the State of Missouri a place I have seen, constructed by a gentleman of our organization, that is the finest place I have seen for the storing away of apples.

Brother Gilbert has a hole in the ground worth many thousand dollars. There is a hole in the ground that would make a grand place; that is it; we can have a hole in the ground to keep the apples. We want a better place than the cold storage, and every man or woman who is interested in this can have a place right where they live. We have got the orchard, the fruit and the ground to make the hole in. Will we make it? that is the question.

Mr. Hazeltine—I would like to ask whether apples will keep better under ground in a cellar or above ground?

A. Mr. Goodman—I can simply tell you that below ground is the best so far as my experience has gone.

Mr. Van Houten—When we were keeping fruit for the Columbian Exposition the fruit kept very well, but we ought to remember that at that time cold storage was in an experimental stage and the fruit was taken in comparatively small quantities, but the great trouble is that the American people try and overdo everything; as soon as they thought they had a good thing they rushed the fruit in rapidly, and the change of temperature of the fruit from time to time caused the injury. The result is that underground cold storage is the best way out of the difficulty.

Mr. Evans—There is one important thing not been mentioned and that is to have the walls to your cellar as much natural earth as possible; that will destroy all disease germs quicker than anything.

Q. How would you remedy that in a cellar that has stone walls?

A. You could have a wooden wall and have spaces in it that will hold the bank back and yet allow the disease germs to pass into the earth. Where the cellar is all right take a little hand spraying machine and whitewash it and that will kill all the disease germs; put a little carbolic acid in with it.

Mr. ————The cold storage where I kept my apple trees has been used as a cold storage cellar, but I think we do not get enough ventilation.

Mr. Goodman—You can never make a cold storage out of your apple cellar, because it has doors open out right on the ground and you cannot keep apples there; if you would dig it out and put double doors inside and outside you might make a cold storage out of it.

Mr. Haseltine—The best plan is to have your cellar with a kind of ante-room where the apples can set and cool off before being put into the cellar, and that also keeps the air from the outside from rushing right into the cellar, and you are able to keep the cellar at a more even temperature.

Q. What are the three best varieties of commercial apples?

A. Mr. Haseltine—There are two that everybody knows and they are the Ben Davis and the Ingram; I wouldn't attempt to name the third one, there are so many different opinions.

Mr. Haseltine—I would say the Ben Davis, New York Pippin and Kentucky Red.

Mr. Barnes—I would say that at the annual meeting of the State Horticultural Society of Kansas last December that that question was decided by ballot, and the Ben Davis got the most ballots, and I cannot remember exactly how they run after that, but it was Ben Davis, Winesap, Missouri Pippin, Jonathan, Ralls Geniting, York, Imperial.

Mr. Wild—For the best three commercial apples I should say Ben Davis, Huntsman and Ingram.

Mr. Moseley—Ben Davis, York Imperial and Jonathan.

Mr. Bell—Ben Davis, Jonathan and a little more Ben Davis.

Mr. Hensley—It would be well for these gentlemen to state what part of the State they are from; I do not think the Jonathan apple would do very well in this part of the State.

Mr. Barnes—I would suggest the following proportion as being a good one for an orchard: 260 Ben Davis, 160 acres of Geniting, 40 acres of Mammoth Black Twig and 40 acres of miscellaneous.

Mr. Hensley—I had a letter the other day asking me how the Ingram was liked in this State, and I said that it was the best apple we had for commercial purposes at present; the Ingram is selling for more money today than any other apple; it is good and firm and bears early and bears abundantly.

Mr. Gilbert—I believe the Ben Davis, Ingram and York Imperial are the best for Southern Missouri.

——— I would suggest one other; they have left out one of the best apples we have; that is the Grimes Golden; I should say the Grimes Golden, Ben Davis and Ingram.

Q. Do you think it would pay to rent 30 or 40 colonies of bees to use to fertilize the apple bloom in an orchard of 80 acres at one dollar per hive?

A. Mr. Secretary—I think that would depend upon whether there were different varieties of apples. If a man had a large block

of one kind of apples, I think it would pay; but if he has his orchard divided with different kinds of apples, I do not think it would pay.

Mr. Van Houton—I do not like to engage in a bee discussion, but I would like to say that I do not think bees are necessary to an orchard's success; I wouldn't give a man a cent a hive for bees to put in the orchard. I agree when it comes to plums or pears, or some fruit trees that it may be essential; to the Bartlett pear and Miner plums I think they are almost essential to success, but when it comes to apples I do not think it is essential for success.

Mr. Wild—As to the question of the bees and paying a dollar a hive for the use of the bees for pollination. Now, if he is a neighbor, I would not pay him anything, but if they come from a distance, I would buy the hive.

Mr. Goodman—I think I would tell a man, if I had an orchard that he could put his bees in there if he wanted to; the universal opinion on that question seems to be that it would not pay.

Q. Who has Bristons Ironclad apple in bearing?

Sec. Goodman—I do not know the apple.

Q. How can the fruit-growers organize so as to keep from glutting the market?

Sec. Goodman—I believe if we could have something like an express company organized to take charge of the fruit, and know that the express company was good, have them under bond, to make proper returns on the fruit, so that you and I when we send our fruit to some market would know absolutely that he did, so that the agent who had charge of that fruit would know in what condition the fruit was received and what was the condition of the fruit there, then he could not say it was rotten when it was every bit good; I do not know that anything of that kind is possible, but I do not know how we are going to help ourselves until something of that kind is done. These co-operation associations and fruit-growers unions are entirely in one man's hands; now, if the man is capable of taking the shipments from all districts, and is an upright, honest man, why it is all right, but you cannot get that man.

Mr. Hensley—I think the Berry Association is working on about the right line. The way they have been working up the South Missouri and Arkansas Associations, they have sent their agents out to the different parts where they are expected to ship fruit to; each man brands his own fruit—sometimes 30 or 40 growers will ship in the same car, but each man's fruit is marked with his name, and the man whom it goes to will realize a dollar on some, a dollar and a quarter and a dollar and a half; each man's brand is on his own fruit, and it is neces-

sary to put fruit up in good shape if you expect to compete. It does seem to me that that is along the right line, if we can only get it into the shape we ought to have it; we ought to co-operate and in an intelligent way, so we may know from day to day the parties who are demanding our fruit and where the market is glutted, etc. That can all be done if we can systematically organize, and this is the day of organization, and I think we are in the right line.

Mr. Paulen—This very thing that is proposed is the very thing that our Legislature and even Congress has been trying to put down, and that is spelled with just five letters—t-r-a-s-t; the best way in my opinion for people to do this business is for everyone to put up fruit in the proper way. It is just the way it was when Daniel Webster went to a certain lawyer and asked about studying law, and asked if there was any room, and that lawyer told him there was always room above; that comes under the law of the survival of the fittest.

Mr. Gilbert—I believe in grading fruit and making it just as nice as possible. If you could grow strawberries as big as that hat and peaches as large as a half bushel basket and had to make a basket to carry each peach in, in the present condition the market is in I do not believe that you could get one-half what it is worth. It seems to me that fruit-growers are just as far from any system for marketing their fruit as the East is from the West. Supposing, Mr. President, that you owned every orchard there is in the State and every fruit plantation of every kind, don't you think you could soon reduce your business to a system? If you were going to consign fruit to Kansas City would you ship to 4, or 5, or 6, or 8 different houses? If you owned the whole output of the State of Missouri, how many different places would you ship to in each city? Just compete with yourself?

We have now growing in this State a crop of peaches which, if properly handled, we can make some money on them; if the growers will get together and adopt some systematic method for the marketing and distribution of this fruit, and there is no doubt but what the net receipts will be at least one-third more than they can possibly be without systematic work. I think the problem of distribution is one of special importance to the fruit-growers of South Missouri, and they should come together now in a meeting and, if possible, adopt some plans of work that we may control the movement of our crop and make something out of it. They are short of peaches in the South and in the East, and they want our fruit, but how do we know where to send it.

Mr. Evans—This question needs more than anything else, organi-

zation and co-operation; I do not see anything of a trust in this co-operation; it is simply an effort to bring about better distribution.

Mr. Paulen—I would like to inquire if you would have this extend all over the United States? if not, how could you make it profitable?

A. Well, when we here at Springfield have peaches ready to ship, the whole United States hasn't got them, and all we have to do is to confer with the other places who have peaches ripe at the same time, and co-operate with them and not send all our peaches to the same place at the same time.

Mr. Gilbert—To illustrate the point I wish to bring out, I will call your attention to the New Orleans market; I was there last year at peach time, and when I started I was assured that the shipments to that city would be made to the house with whom I was associated; our peaches were the only fine peaches on the market; there were no peaches from any other state and no peaches from any other part of our State, except those shipped from Mountain Grove, that could equal our peaches.

Had the growers taken my advice and consigned the peaches they sent there to one house, and let that house control their peaches and only ship the amount they could handle properly, the peaches sent to New Orleans would have netted the growers at least a dollar a crate more than they did, but instead of that there were two or three that picked over the place and consigned to different houses, and the result was that inside of a week you could find a great big Elberta peach that brought \$2.25 a crate when I first went there, selling for as low as a dollar a crate sometimes, and it was the growers fault.

It does seem to me we could all get together and agree on some action in this matter; put ourselves under bond for at least one year to comply with the stipulations of the agreement we may go into, and make the bond in such a way as to compel us to do that. I believe it would demonstrate to our entire satisfaction that the thing could be worked on a system and worked successfully.

Mr. Goodman—The only solution to this question can be that one, or two, or three men, as one man shall be head and have authority to say when they go, where they go and how they go, and until we can have confidence in that man with absolute authority, and when I turn my fruit over I will know whether it is going to California or New York city; but the man who is at the head of that knows his business, and until we can have confidence in that man or that association to turn over all our fruit, we will have this difficulty; we cannot help it; someone must have this authority and control it.

Mr. Van Houten—Perhaps something about the Council Bluffs

Fruit Growing Association would be interesting to you. They had an association in that county. Well, they took in all the surrounding counties that wanted to come in, and they charged a fee of \$10, so that each one who came into it would feel an interest in it; and when they sent off fruit it was all sent through that one man or agent; each man branded his fruit, or his boxes, so they could trace it, and now their experience is that they are getting more out of their fruit than they could get in any other way; they save more time, more trouble and get more for it. It is a part of the business of this association to learn of the reliability of commission merchants, and they have saved a great deal by consigning only to those men who are known to be honest, where before they had consigned to a great many who were absolute scoundrels. The co-operation is absolutely essential to success, and the quicker you can get this co-operation and the quicker you can appoint a man to look after it, the quicker you can have success.

Mr. Gilbert—It seems to me that we are about to pass over this question without any definite action, and while there has been a move made for the perfection of a union for the berry-growers, yet there has been nothing done for the benefit of the peach-growers, and if we do anything at all to benefit us for our peaches, it must be done at once, and if it is not putting the matter too strong I would like to have you ask for a rising vote of all the peach-growers in this room who are in favor of co-operation, and who are willing to say that for one year they will enter this and will go together and formulate plans and arrange this matter as best we can, and, if necessary, put ourselves under bond to stay with the association for at least one year, and see what we can do, and set a time for the meeting and get together and do it.

Mr. ——— I would like to amend that and say fruit-growers instead of peach-growers.

Mr. Evans—I think Mr. Van Houten has given us a good suggestion, and I think if that motion can be amended a little further it would be better. I am in favor of a \$10 fee and \$40 forfeit; that is, put up \$40 to be forfeited in case of withdrawal, and have no bond about it; let the fee be \$10 and the forfeit \$40, making \$50 in all; the \$10 fee to go as working capital. Now, I will comply with Mr. Gilbert's request, and all fruit-growers who are in favor of this co-operation and in favor of organization and willing to co-operate afterwards, please rise to your feet and stand until you are counted; we will say for the State of Missouri, including the border of Arkansas.

Fifteen stood.

After adjournment, the peach-growers affected a temporary organization, with J. C. Evans as president, and S. W. Gilbert as secretary.

THURSDAY, 8 p. m.

Music—Ivy Mandolin Club.

KIRKWOOD, Mo., June 8, 1897

DEAR MR. GOODMAN—As it was not possible for me to come to Springfield to the summer meeting, I do the next thing and send a contribution to the insect discussion. I have chosen a subject upon which most of my correspondents this spring have requested information. I hope it will prove interesting to the members of the State Horticultural Society.

I also send with this a little box of specimens, illustrative of the paper. With best wishes for the success, horticulturally and socially, of the session, I remain,

Yours sincerely,

MARY E. MURTFELDT

PLANT-LICE AND THEIR ENEMIES.

The most notable feature of insect development the present season has been the almost unprecedented abundance of various species of plant-lice.

Scarcely had the leaves begun to unfold than orchardists were dismayed at discovering the blossom buds of their apple trees dark and "mossy" with the minute, but innumerable forms of the common apple aphid (*Aphis mali*). So extensive and so virulent was the attack that great apprehension was felt concerning the fruit crop for the year. Spraying with kerosene emulsion, the standard remedy for most leaf-feeding plant-lice, was practiced, in some instances with good results, but in others, perhaps because of imperfect emulsification of the oil, injury to the blossoms was reported. All sprays are detrimental on the unfolding blossoms. The cool, moist weather, however, promoted vigorous growth of the trees and the aphids scattered or diminished in numbers and in most localities were found to have done no great damage. At present except on young or recently transplanted trees the lice are mostly confined to suckers and watersprouts which should be cut off and burned or removed to a considerable distance from the orchard and "dumped" in order that the carnivorous larva feeding on the pests may have opportunity to develop.

Following the apple aphid, certain black species, affecting the cherry (*Myzus cerasi*), the plum (*Aphis pruni*), and others began to excite apprehension. And certainly the trees attacked did, and still do, present a most discouraging, not to say revolting spectacle, with a majority of the growing points covered and the young leaves curled and blackened by the myriads of the pests, that so crowd the under

surfaces that there is scarcely room for the insertion of another beak. Spraying at this time avails but little, as the insects are so protected by the distorted leaves that the majority cannot be reached by any fluid, however, forcibly projected. Severe cutting back of the infested branches is the only preventive measure practicable at this season. This should be accompanied by such stimulation of the growth of the tree, by cultivation and the application of potash fertilizers as is possible. The rest may be left to nature, who, now that warm weather has set in, is marshalling her parasitic and cannibalistic hosts against the sap-sucking millions and will soon have them in subjection.

Neither the vineyard, the small fruits, the vegetable nor the flower garden have this year escaped a disastrous visitation of the same ubiquitous pests. Among the small fruits currants have especially suffered, a large proportion of the leaves showing from the upper side the dropsical puffiness and discoloration that tells of the colonies of voracious pale green lice which make their home in the concavities of the under surface. These, as well as the black plant-lice of the grape (*Aphis vitis*), can be dislodged—and probably by that means destroyed—by pyrethrum powder, tobacco dust or air-slacked lime, applied with an insect-powder puff or bellows, of which there are numerous patents.

In the flower garden the most unmanageable species is that which attacks the honey-suckles. Small plants may be cleared by smoking or steaming under some sort of tent-like cover. Tobacco should be used, either the stems or coarse leaves slightly dampened and burned over charcoal, or the fumes from a tea, or the extract of tobacco poured into a vessel of boiling water. Spraying with the two latter preparations of tobacco is measurably effective, except where the insects are too much protected by the density and curling of the foliage.

In our own garden two large plants were cut to the ground while in full bloom and the tops burned as the easiest way of preventing the spread of the pest.

Several extracts of tobacco are now in use by florists in preference to fumigation by burning the stems or leaves.

A friend of the writer uses an extract called the "rose-leaf" brand, which is poured into boiling water in the proportion of an ounce to a gallon of water, and thus disseminated as steam through the tightly-closed plant-houses, all the employes meanwhile taking good care to keep outside, as the fumes are very poisonous.

The peculiar and complicated developments of the *Aphididae* make them at once the most interesting and the most difficult subjects of a study afforded by the insect world. Their prodigiously rapid multiplication, viviparously, at certain seasons of the year, instead of

by the slower method of the laying and hatching of eggs, as is the rule in the development of insects, accounts for their appearance in such vast numbers, and, insignificant as they are individually, places them in the rank of the most formidable enemies of vegetation.

The life history of the various species, though subject to much variation, may be summarized as follows:

Very early in the spring single aphids hatch here and there on the swelling buds of the plants subject to them. Each of these becomes what is called a "stem mother," and is capable of a certain kind of reproduction without mating. In about a week, if the season is favorable, this insect, of which the average size is about that of a mustard seed, begins to produce living and fully formed young by a process similar to budding in plants. From six to ten are often brought forth in twenty-four hours. The first act of each of the young is to plunge its invisibly fine beak into the tissues of the leaf on which it finds itself and begin extracting the sap. In from four to six days it also begins to reproduce in the same manner and quite as rapidly as the stem mother, which, in the meantime, has gone at the same rate, adding to her colony. In this way the crowded groups, so often noticed, are easily accounted for.

Later in the season when the leaves and young shoots are not so full of sap the individuals scatter more, and on the worst infested plants where the foliage has begun to dry, a large proportion suddenly acquire wings and are thus enabled to migrate to new food plants. Indeed, this migrant form develops, after a time, in every colony, even when there is no lack of nourishment. In the autumn, in most species, winged males and true wingless females appear and, after pairing, the latter seek the tips of the new shoots or scatter over the bark of trees and lay the eggs from which the stem mothers are produced the following spring. These winter eggs, usually black, shining atoms with very hard shells, are difficult to destroy, but a thorough drenching with rather strong kerosene emulsion, or whale oil soap suds, which may be used with safety on a tree or shrub in its leafless state, will prevent hatching and thus nip the whole plant-louse plague in the bud.

Those who suffered so severely from these pests this spring should bear this fact in mind and treat their trees according to directions during mild spells in winter or very early in the spring.

It is almost exasperating to see what provision nature has made against the extinction of these, to us, so objectionable forms of life. The species that are destructive to annual or herbaceous vegetation, in the autumn instinctively migrate to shrubs and trees or to the roots of grasses or other perennials on which, in the spring, the stem moth-

ers appear, and the first generation or two are born, winged forms developing as soon as the plants, which they more especially affect, are sufficiently grown to afford them support.

Examples of this change of food plant are found in the destructive hop-louse, the eggs and the spring broods of which occur on the plum; and of the melon-louse which has been traced to the roots of the strawberry and other low growing perennials. In a few other cases there is evidence that the eggs carelessly dropped to the ground are gathered up by the sharp-eyed ants and preserved in their galleries until spring, and then brought by them to the plants upon which they subsist. This is not benevolence on the part of the ants, but a provident instinct for their own future enjoyment, as it is well known that they are exceedingly fond of so-called "honey dew" which most aphids excrete. Prof. Forbes, of Illinois, who has studied with great perseverance the obscure life-history of the corn-root aphid (*Aphis maidis*) has found that the sexed individuals are carried by a species of ant to its nest in the late fall. There the eggs are laid, which are cared for by the ants throughout the winter, and when hatching takes place, long before the corn has begun to grow, the tiny aphids are carried to roots of grass or weeds upon whose juices they make shift to exist until the corn is ready, when they are transferred through underground galleries to their preferred food plant, and are continually watched over and attended to by the ants for the sake of the sweet fluid supplied through their honey tubes.

The gall-making plant lice form another exceedingly important interesting group. Among these we find the *Grape Phylloxera*, which almost wrecked the wine makers of France and caused the extinction of many choice varieties of grapes in this country. A partial remedy for the evil in Europe was found in the introduction of the more resistant stocks from America, upon which the susceptible varieties could be grafted; but a recent report brings the discouraging information that in European soil even the Concord roots in time lose their immunity and succumb to the tiny root-burrowers. It is to be hoped, should this rumor prove true, that Prof. Stedman's method of applying the tobacco remedy, may be found effective against this species as in the case of other root infesting forms. Other species of gall-lice produce the pocket-galls and cockscomb galls on elm and some very singular forms on hickory and other trees.

Among the insect enemies of plant lice we find fifteen or twenty different species, all of which render important service. One reason why the aphids were so destructive this season is that the floods and

unusually heavy rains had destroyed many of these useful insects, while the cool and cloudy weather prevented others from appearing.

The principal destroyers of plant lice are the small handsome beetles which the English call "Lady-birds," and the Americans "Lady-bugs." As most of the earlier writers on entomology used the English appellation it has become the standard one. Almost every one recognizes these pretty and beneficial insects at sight, however, little he may know of entomology, and he knows also that they should not be killed. There are a dozen or more distinct species, but all have the same habits. It is while in the larva or growing stage in which they are not unlike miniature alligators—that they are most voracious and able to dispose of a large colony of the aphids in a very few days.

Next to the lady-birds in point of usefulness are the somewhat similarly shaped "Aphis Lions," the young of two or three species of lace-wing flies. After these come the syrphus flies, whose legless and headless larvae look like slender jelly-like slugs. They also require a great many aphids to nourish them to perfection. The soldier beetles in their running about also enjoy a feast of the sweet and juicy animated atoms whenever they come across them. So likewise does the red paper-making wasp, *Polistes Rubiginosus*, whom I have observed to gobble up a whole colony at a meal. The tree crickets also make use of aphids exclusively as their "baby food," although when mature they do some damage to vegetation. Some other insects might be added to this "roll of honor," but those mentioned are the most dependable of our allies against the minute myriads, that without their interposition would soon sweep vegetation from the face of the earth. Warm sunny weather brings them out in thousands to the rescue, and we may take courage in the certainty that the "Aphis plague" will soon subside.

MARY E. MURTFELDT, Kirkwood, Mo.

Violin solo—Prof. Kelly.

SOME REMINISCENCES OF HORTICULTURE.

Mr. President and Members of the Mo. State Horticultural Society—I see that you have honored me by a place on your program to give you "Some Reminiscences of Missouri Horticulture," and as I cannot be with you in person, as it would certainly be a "feast of reason and a flow of soul" to meet my many old friends once more, grasp their

kindly hands and exchange experiences, I will try to do the next best thing, and send this paper as a substitute.

When my memory carries me back over nearly 60 years, when as a boy of 10, I first, the youngest of our family of six, father, mother, two sisters, brother Fred and myself, least and last, came to Missouri and landed at St. Louis, I can hardly realize the vast changes which have taken place since then, especially in Horticulture. St. Louis was then a village of hardly 8,000, mostly built by the first French settlers, and strung out along the banks of the Mississippi river, with one open market place at the foot of Market street. The few fruits to be found there were mostly in the old French gardens and seldom seen in market. I remember some immense pear trees in Vena hall gardens, the southern part of town, then owned by the Soulard family, which bore very good fruit, but were considered a great rarity. The tomato had just been introduced, but was scarce in market yet and only appreciated by a few. To initiate us into farming father had rented 10 acres 4 miles south of town, on Payne's farm, where we cultivated vegetables for market the first summer, and my brother and myself had to start for market every morning at 2 o'clock to be there by daylight ready for business. But I will not tire you with personal experiences, only in so far as they are connected with the subject. The next spring we moved to the backwoods, 4 miles south of Hermann, where father, as stockholder of the German Immigration Society, had purchased 200 acres of land. The place was an entire wilderness where a log house had been erected during the winter, and about an acre of land cleared around it from a dense grove of timber, which father intended to have for an orchard. He had collected a few peach jets the previous fall of the best varieties he could find; a friend had presented him with a small apple tree as something very choice, which, when it bore fruit, turned out the old Rawles Janet. These, with a seedling, my mother found in the woods and some sprouts of apples from old orchards, then the usual way to plant new ones, were carefully planted; all grew and laid the foundation for a family orchard. This was then the usual manner to supply the families of the few early settlers with fruit; grafting and budding were almost unknown sciences, and as the old trees were all seedlings, the suckers reproduced themselves. The woods were full of wild fruits of different kinds—the Virginia cherry, wild plums, some of these very good, large and sweet; the neighboring thickets abounded with numberless varieties of the summer grape (*Vitis Nestivalis*), and the creek bottoms with frost grape; some black cap raspberries, blackberries and persimmons, the small prairies with wild strawberries; and it became my Sunday pastime and recreation

to find the best varieties and plants and bring them home as a welcome treat to the family. Some of the plums and summer grapes were especially fine, and I have often thought since that they ought to have been preserved, but when I became familiar with propagation later on the best had disappeared. Or was it only the glamour of a boy's fancy which made them look and taste so good then?

So we lived along for a number of years. Our orchard bore its first fruit, the peaches mostly cling-stones, and ripening nearly at the same time, but we thought them excellent; no doubt our best policy, for "When ignorance is bliss, 'twere folly to be wise." There was very little communication with the outer world—in summer by steam-boat; in winter by a mail-rider once a week, provided wind and rain permitted. Postage was 25 cents a letter. How could we know much of the advances which the country east was making? We cultivated our field crops by hand, some 40 acres of land, and certainly had enough of hard and daily toil.

The next indication of an advance we perceived came from a Mr. Heinrich, who came from Ohio to Hermann, bringing some choice peach trees and a few vines with him, which were planted in a lot on the corner of First and Schiller streets. This must have been about 1842-3, as they bore fruit in 1844-5. Also some Isabella vines, planted in an arbor by Mr. Fugger on the opposite corner. When they commenced to bear we saw the great difference between them and our seedlings, and began to hanker after better fruits. The small beginnings made by Fugger & Langendoerfer with the Isabella and Catawba were so successful that a club was made up to send for cuttings to Cincinnati, which arrived on the deck of a steam-boat, fully exposed to the sun, and had to be soaked several days before they became fresh enough to plant. Of these I planted 300 on my father's farm, who was one of the subscribers, in spring of 1847, my first initiation to viticulture. Mr. Michael Poeschell had planted a small vineyard of Catawbas in 1844, of which in 1846 he made 1,200 gallons of wine from two-thirds of an acre, and sold some of it at \$4.00 per gallon. This gave the first impetus to grape culture in that neighborhood. The father of our present esteemed friend, Jacob Rommel, Sr., was also one of the pioneers in this branch, as also in fruit culture. But the main impetus to that neighborhood was given by Charles Teubner, father of your present member, who came to Hermann in the winter of 1846-7, purchased the old Ellison place just below, and imported a large lot of fruit trees of all kinds, several thousand, as well as about 3,000 grape vines, strawberries and other small fruits, and converted the eastern hill-side, about 30 acres, into an orchard and vineyard of

the choicest varieties then known, with an old orchard already on the place as a basis. The trees were mostly purchased from the Sayers Nursery at Cincinnati, but he also brought the Herbemont, Ohio Segar Box and Elsinburgh grapes from Longworth's nurseries. Among the peaches then introduced for the first time I will name Early York and Yellow Alberge, then the earliest, Early Tillotson, Yellow Bartrize, Morris' Red, Royal George, President, Old Mixon, cling and free, Brunort, Morris' White Rareri, Crawford's Late, Columbia, Heath Cling. The apples included all the best Eastern known varieties, early and late; pears, Early Madeline, Bloodgood, Bartlett, White Dogenne, Snkel, Buerres Boec, St. Germain, etc.; cherries, Mayduke, Black Tarvarian, Gov. Wood, Napoleon and Holland Bigarreau, etc.; several varieties of apricots, nectarines and quinces; strawberries, Early Scarlet, Longworth Prolific and Hovey's seedling. I am thus explicit because this plantation was the nucleus from which thousands of orchards were planted afterwards, which came from the nursery of Hasmann & Manwaring.

The sudden death of my father in November, 1847, and the sale of the farm the following winter, changed the current of my life, and led me, a raw country boy of 20, brought up in the backwoods, to adopt horticulture, for which I always had a longing, as my profession. Mr. Tenbner had married my sister, Josephine, the summer before, and offered me a position with them on his fruit farm, which I gladly accepted. I helped him to take care of his orchard and vineyard, which produced its first fruits in 1849. So far I had seen little of the outside world, but with the natural hankering of all young men, I desired to see more, and embarked, against his protest and that of my sister, in a trip to California, then not the leading state in horticulture, as is now, but only the Golconda, of which its possibilities for other productions were not even surmised; but its glorious climate captivated me even then. But, after roughing it in the mines for 15 months, I received a letter from my beloved sister, bringing the sad news of Mr. Tenbner's death, and requesting me to come home and help her to take care of the place and her two little children. Such an appeal I could not resist, and bid adieu to California and its golden prospects.

When I arrived in March, 1852, I found my hands full of work, as the place, fine as it was, had necessarily been neglected since its owner's death. But I had had a fore-taste of horticulture, and though I had never grafted a tree or budded a peach, I thought with the help of good books I would learn to do so. I found Downings' "Fruits and Fruit Trees of America," Thomas' "American Fruit Culturist" and Kendrick's "Work on Fruits." These I studied by night, sometimes

until 12 o'clock, for the days were taken up with incessant work. From these I learnt the theory of grafting and budding. Mr. Teubner had commenced a small nursery, only a few hundred trees, to mostly fill vacancies in his own orchard. I read up on varieties and then tried grafting myself, by candle-light, on a few hundred seedling stocks I found. These succeeded beyond my expectations, nearly every one growing. Then another difficulty arose. The vineyards of Catawba and Isabella, which promised so much when I left, were suffering from rot and other diseases, and the Isabella was considered worthless. I found about 50 strong Isabella's in the vineyard. Could not they be changed into something better? The Nortons' Virginia had just been brought into notice, introduced by Dr. Kehr from Virginia, and by Mr. Heinrichs from Cincinnati. The Herbemont, brought from Cincinnati by Mr. Teubner, had produced fine crops. Could not these worthless Isabella be changed by grafting into something better? I consulted Downing and found but one remark, "that vines were sometimes grafted below the ground in the usual way, by heft grafting. It had never been tried by our vintners, but I determined to do so, and succeeded beyond all my expectations. Nearly all of them grew, and as they were strong vines, some of the graft made a growth of 25 feet the first summer, which at once made grape grafting popular when it had not been known or practiced before.

The splendid fruit produced by the young orchard created a desire for trees of similar kinds. I visited the Fair of the State Agricultural Society at Boonville in the fall of 1853, where I met and competed with the exhibition of fruits by Mr. Julius Mallinkrodt of Augusta; became acquainted with this pioneer nurseryman, and, tyro as I was, carried off second prize on best collection of fruits, and first prize on quinces. Encouraged by this, the lively demand for trees and the good prices obtainable for them, I enlarged the nursery rapidly. I began to correspond with Charles Downing, Dr. Warder, Robt. Buchanan and other eminent horticulturists, and the kind encouragement and advice from these veterans of horticulture encouraged the novice to make his first attempt to write for the horticultural press in friend Colman's Valley Farmer, now the Rural World. A love of horticulture and its votaries took possession of me, which has accompanied me through life, made every horticulturist seem like a dear brother, and will, as I hope, stay with me to my dying day.

The nurseries in those days were few and far between, and confined to a limited acreage. The Augusta nursery of Mr. J. Mallinkrodt, the Segirson nursery near St. Louis, mine and Mr. Jacob Rommel, Sr., at Hermann, comprised about all. Trade was conducted in a different

manner from now; customers either came to the nursery direct or sent the orders by letter, if from a distance, trusting to the honor of the nurserymen to furnish sound trees and tree to name. No, I could guarantee all my stock, taking the scions from trees in the orchard; orders came in thick and fast, and necessitated an immense amount of correspondence. Still I cannot help but think this primitive way more satisfactory to the customers than the later method of selling through glib-tongued agents, always on the hunt for so-called novelties at exorbitant prices, and who often makes a dozen varieties out of a single row, if they can have their way about it. Some of my old time customers may be among you today, and I am not afraid to appeal to them for endorsement.

But I must condense these reminiscences or I will become tiresome. I only wish to give you a glance at "Auld Lang Syne," until the establishment of the forerunner of your present society, and will be as brief as possible. In the winter of 1854, a few of us organized the Gasconade County Agricultural Society at Hermann, perhaps the oldest county organization in the State, which commenced with ten members, no capital but a monthly contribution of ten cents and a dollar admission fee, and has yet continued until now, holding annual exhibitions even during the war. I had the honor of being its president for 12 years, being re-elected until I refused to serve. During the first years of its existence the name and quality of the fruits and wines of Hermann had become famous, and when the Pacific railroad was opened as far as Hermann, its peaches, apples, grapes and wine became known along the road, and even in other states. Most of these were shipped to St. Louis, and at what now would be considered extravagant prices. Peaches would bring from \$2 to \$3 per bushel with the Italian fruit stands, who would instruct us to pack them in boxes holding $2\frac{1}{2}$ bushels, and in fresh leaves, a tedious process, and which will no doubt call forth a smile on the experienced packer of today. But I recollect that a single large tree of Royal George brought me \$26 at St. Louis, all being sold at \$3 per bushel. We were not troubled with curculio or maggots in peaches then, nor codlin moths in apples and pears, and could count on a fair crop of peaches every other year.

Missouri, therefore, seemed a paradise for fruit-growers at that time, and horticulturists from other states had their attention drawn to it, among them F. M. Elliott, the distinguished but somewhat eccentric author of the Western Fruit Book. He established an ornamental nursery near Eureka, St. Louis county, and with him originated the idea of a State Pomological Society. The matter was talked over with some St. Louis friends, and in the winter of 1857-8 about a dozen of

us from the lower part of the State ran up to Jefferson City on the afternoon train to attempt an organization, while the Legislature was in session. The town was crowded, and we had difficulty in finding accommodations, which were at last secured in a large room at the Tennessee House, three in a bed. A caucus was held that night. It is so long ago that my memory fails to give all the names present, but as near as I can recollect they were Elliott, Mr. Garnett of St. Louis, N. J. Colman, Wm. McPherson, Dr. L. D. Morse, Jacob Rommel, Sr., and myself. After looking around the next day, and conferring with the men we considered most likely to favor the plan, we obtained the use of the House of Representatives for the evening, and then the organization was effected, which was the forerunner and parent of your present Society. Gen. James L. Minor, of Jefferson City, in a neat speech, warmly advocated the plan, and Norman J. Coleman was chosen its first president. It may be truly said of this small beginning "that tall oaks from little acorns grow." Your Society is now spread over the whole State, numbers its members by the thousands, at home and abroad, and may be called one of the most successful and influential State organizations in the country.

But, with the garrulity of old age, I have already filled more pages and taken up more of your time, perhaps, than you can spare. Yet I have merely attempted to give an outline of the beginning of horticulture in a State in which I have lived for forty years, and where I was initiated into horticulture as a life-long pursuit. There are many of you, no doubt, who are familiar with the pleasant early meetings at St. Louis, the pleasant visits to and from our friends in Illinois and Kansas, the triumphs we achieved at fairs and horticultural meetings. But should it be desired, and health is spared me, a rambling sketch of later days, until I left Missouri, will be furnished for your winter meeting. It is good for the soul to bring up recollections of the past sometimes, memories of friends still living, whose circle is diminishing every day; and of the dear departed, with whom we labored in times gone by.

Wishing you a profitable and pleasant meeting, I remain,

Your old friend and co-laborer,

GEO. HUSMANN.

NAPA, CAL., May 28, 1897.

Song—Our Country. Composed by Prof. Troemel. Sung by Albert Ponnitzky, boy soprano.

OUR LOCAL HORTICULTURAL SOCIETIES.

After attending a meeting like this one of the last three days, with the vast amount of information furnished by able and practical horticultural workers, a subject like this one might seem to be of little interest. Did not we pause to remember that all things have a beginning, and that, in its way, the Local Horticultural Society has just as important work to do as the State Society, towards which we look with so much pride and interest.

The reports of this Society's meetings are read in many states, discussed by many local workers, and have been and will yet be the means of bringing many good citizens to our State.

It was the reading of some of the addresses of Vice-President N. F. Murray that decided us to choose the Ozarks for our home, and fruit-raising for our future occupation.

Our coming here brought several others to see this country, most of whom located in South Missouri, and all came here for the special purpose of raising fruit.

Many are novices in this work, and to them the Local Horticultural Society is almost a necessity.

In this local work we do not have the array of experience furnished by the State Society, nor the scientific and practical methods taught at the University, but we can have the requirements of knowledge that make it the average farmer's School of Horticulture.

Attendance at these meetings creates a desire to attend the State meetings, and to send our children to take a thorough course of study at Columbia. But only a small number of our fruit-growers are able to do either of these. Those who can be present at the local meetings, and by taking part in the work, can not only gain valuable information from their neighbors' successes and failures, but can be of benefit to others by telling their own experiences.

The successful horticulturist of the future must be full of zeal, and improve, not only upon nature herself, but on the work of past generations.

Wonderful results have already been gained, and the treasures of knowledge that have been obtained in the last few years give added hope to the coming workers.

I believe it would be of great value to us were our local Societies to consider themselves auxiliaries to the State Society, and be ready and willing to furnish a report of its work at any time.

Our local societies have standing committees in the different departments of work, and these should be able to furnish all local information in their vicinity regarding condition of fruits, ravages of insect enemies and other items of importance.

In no one way can we gain as valuable information as that furnished in the State reports. Our local reports would be just as reliable, and both State and local will become of yet more value as experience is added to experience.

We hope the horticulturist of the future will have opportunity for instruction in the public schools, but the horticulturist of today must gain his knowledge elsewhere, and perhaps in no one place can he obtain more than in the local meetings listening to the experience of his neighbor and fellow-worker.

He who attempts to study alone and hopes to gain all by individual effort, must of necessity lose years of valuable time. He will make the same mistakes made before him, and when he finally awakes to the fact that the progressive man is getting ahead, he finds he is too far behind to ever hope to catch up.

In all lines of action in this great world, progression is made only by taking advantage of knowledge already gained and working ahead from there.

One of our great needs is to get the people to attend these local meetings in larger numbers.

Our home Society is not yet two years old and has a membership of 94.

Our summer meetings are held at the residence of some member, and call out a large attendance, and many are interested in this way.

Many condemn experimental work for the average fruit-grower.

For the beginner, we can all see the benefit of growing only well known and standard varieties. He has enough to do to become acquainted with those sorts most certain of success; but having passed this stage, and with the progressive spirit strong within us, we long to try something outside the usual line, and I contend that this is as it should be. Our experimental stations and nursery-growers' work on this line is the best of its kind, but if the individual desires to go outside of ordinary work, and do a little experimenting for himself, I do not think it would prove a detriment to more solid work. An enthusiastic amateur may become an important factor for the advancement of horticulture.

Zeal is the key-note to all success, and perhaps in no calling is enthusiasm more necessary than in this one. The many discouragements, linked to our ever-present ignorance of the best ways and

means, exhaust a large amount of enthusiastic vitality, and it is a very essential quality to have an abundance of.

In our societies women are taking an active part, and doing good work. I can hardly see how it could be otherwise. Our local meetings are a series of "experience" discussions, and whoever does practical work has something practical to talk about. A large number of my sex are natural born horticulturists, and many now do practical and successful work in this line, and many more will be added to this number when we have an opportunity to get to look at this work in its proper light. Nearly all women plant and cultivate something under the domain of horticulture.

What we sometimes term "society" presents some obstructions to the full desires of many women in this line of work ; but does it not seem strange that this same "society" will often praise the woman who prepares the soil for her flowers with a butcher-knife, and cultivates them with a kitchen fork, but with uplifted nose pass by on the other side of the street, should that same woman take hold of a common spade, and dig, plant and train a few apple trees ? She might raise a few flowers ; she is nearly certain to grow a good many apples, and I leave it to you which is the hardest work. Not that I would discourage the growing of flowers in each and every home, but if the flowers I prefer grow upon apple and pear trees or blackberry bushes, it is certainly just as easy to raise those, and I shall lose none of my womanly dignity by doing so.

Perhaps the greatest advantage of this work for my sex is that it does not take us away from our homes and home duties. Those of us who need or desire some work outside the line usually given over to us, work that is healthful, taking us out into the sunshine, filling our thoughts with the beauties of nature, and making us forget many of the darker sides of life, should choose horticultural work.

Possibly best of all, is the opportunity while we work of teaching the little ones, and directing their rapidly expanding minds along natural lines.

Diverse studies we must have in modern horticulture. The sciences are not to be left out by any means. Botany and entomology are studies we cannot be too familiar with, Vegetable physiology and many other lines must be studied and closely followed. We have reached an age when we must market the results of skill, and they are the product of education. Every individual who grows fruit should be a member of a local horticultural society. They can here do the most good, reach the largest number of people—for this is a common interest. This is the one place of all others where our farmers, with

their families, can obtain the necessary study, which added to their experience, will make progress triumphant over low prices and high transportation, and bring peace and plenty to that ideal life—a country home.

ALMA Z. MOORE, Mountain Grove, Mo.

Music—Ivy Mandolin club.

THE BEST BEDDING PLANTS.

Mr. President, Ladies and Gentlemen, Members of the Horticultural Society and Guests—You have asked me to say a word or two about the best bedding plants. I am very much at a loss to know how to begin at this subject, and might, perhaps, with a dozen words, embody all that I will say during my somewhat longer discourse, for “the best” properly interpreted would mean just what the words imply and limit me to the naming of two or three plants which form the foundation and practically the entire structure of our bedding system. I refer particularly to roses, geraniums, colons, verbenas, alternantheras, and a few more with which everyone is familiar; but there are a number of other plants that will bear mention, and I presume it is of those that you would like to have me speak. Of course, bedding plants, strictly speaking, are those which are used for the making of geometric flower beds in which the designs are formed through the contrast in colors, either of the foliage or flowers of the various varieties of plants used. But in allowing a little scope to the word, and comparing the entire list of plants that may be used for planting out of doors in the summer, we can speak of a great many varieties which would otherwise be out of place.

Abutilons are quite popular as border plants, making nice single specimens and adding variety to the display in our gardens. There are two particularly meritorious varieties which are noted for their flowers. They are, the white one “Bouledeniege” and the yellow “Golden Bells;” then there are two or three very good varieties which are particularly attractive on account of their foliage. *Acalypha*, *achyranthes*, *alternantheras*, *colons* and *echevarias* are used particularly for their bright and showy foliage in the making of so-called carpet beds and designs of all kinds, the various shades of color being modifications of green, red and yellow.

Sweet alyssum does very nicely in a shady, cool spot, blooming profusely throughout the summer. A few varieties of begonias are

excellent summer bedding plants if they have a sheltered spot where the sun does not strike them too strong, the tuberous-rooted varieties being particularly recommended for this purpose. But a variety called "Vernon," coming in all shades between pure white and deep crimson, is doing better in this section of the country than the tuberous-rooted sorts.

Cannas have grown to great popularity in the last five or six years since the introduction of the dwarf french sorts, and we have no plant that will make a greater display for the same amount of care. They do well in the full sun and produce highly attractive flowers in all shades of yellow and red. Among the most attractive standard varieties are Charles Henderson, Florence Vaughan, Paul Bruant, Paul Marquant, Madam Crozy, Souv. De Antoine Crozy and Koenigin Charlotte. During the last year two new varieties have been extensively introduced, and are truly worthy of all the praise bestowed upon them. They are the varieties Austria and Italia. These varieties produce flowers with the individual florist eight and ten inches in diameter. They are magnificent specimens of horticultural progress. There is but one fault possessed by them; that, on account of the extreme large size of the flower they do not stand the strong winds that often prevail here, and should be planted in a slightly sheltered spot.

Chrysanthemums, such as are advertised in the florists' catalogues, cannot be recommended as bedding plants. But many of you have some old clumps of the hardy varieties of our grandmothers' gardens, which are truly ornamental and worthy of greater care than has been bestowed upon them during the past few years. The new varieties are for the most part too late in blooming to be of any value to the person that wants a display out of doors.

Clematis *Paniculata*, an improvement on the common virgins bower, which is a native of this country, is a magnificent vine, perfectly hardy, and covered in summer with masses of clusters of white, highly fragrant flowers; it should be in every yard.

Dahlias are beautiful flowers, produce large quantities of highly colored blooms in the latter part of summer, and as there is a large variety of colors in them, you can get a great deal of pleasure out of planting a collection.

In geraniums we have made a great deal of progress in recent years in the matter of size and brilliant coloring of the flowers. Queen of the West, an old favorite, is still the most called for variety, but a few of the newer bright reds are worthy of mention. Among them are Duke of Fife, James Kelway, Jules Privat and Red Shirt. It is hard to say which of these is the best, but all are worthy of a trial.

Heliotropes with their fragrant lavender and purple flowers make an indispensable attraction for the flower garden.

Hibiscus Sinensis, Chinese varieties, particularly Regia Maxima and Subviolacea, make excellent centers for vases or for flower beds, and when they grow to be of considerable size they are beautiful single specimens in a lawn. The dwarf blue lobelia does very well except in the full sun where it often burns out in our extremely hot weather. But as blue flowers are quite rare, we feel it is indispensable.

Among roses the hardy varieties are of course almost innumerable ; but I will mention two or three particularly as being sure of giving satisfaction wherever planted. Ulrich Bruner is a magnificent red, as also are Gen. Jacqueminot, Gen. Washington and Mad. Chas. Wood. Magna Charta is a pink, and Coquette Des Blanches is a good white. Other good roses which are hardy here, but not generally classed among the hardy varieties, are Clothilde Soupert, Meteor, Etoile De Lyon, Duchesse De Brabant and Hermosa. The last list of roses just given is truly ever blooming.

I might mention a great many other varieties of plants that are worthy of notice, but think I have mentioned too many already to come under the head of "best bedding plants."

I regret my inability to be with you at this meeting, there being other things which I cannot avoid, to keep me away from you. I trust that what I have said may bring out some discussion, and by getting expressions from some of your members you may be profited to some extent. Trusting that this meeting will prove a profitable as well as entertaining one, and thanking you for your indulgence, I am,

E. H. MICHEL, St. Louis, Mo.

A FEW HARDY HERBACEOUS PLANTS.

As winter passes by and stormy March with occasional warm days and sunshine starts the crocus and mezeriums into bloom, the thought comes to us, what shall we plant, what kinds will best meet our wants to beautify our grounds.

Naturally, most are inclined to such shrubs and plants that are perfectly hardy and of easy cultivation ; those that in a manner take care of themselves from year to year.

In a choice selection of shrubs and climbers, a succession of bloom from April to October may meet our desires, but with all we are not satisfied, we are prompted to look to the humbler herbaceous plants to fill many of the floral voids that are likely to occur during this time.

The enthusiastic lover of flowers, too busy in the affairs of life to bestow much time on their care and culture, will find in the hardy perennials and bulbs, such plants most suitable to them.

The best mode of planting the different kinds, whether in the background, in clump or beds, the fancy of the planter or the location may best determine.

A list of the most desirable herbaceous plants is very long, and a few only of the old and long tried varieties can be given in the limits of this paper.

The lily of the valley always has been a favorite; every collection should contain it.

The Dielytra is one of the most elegant plants, both in flower and foliage; blooms in April.

The Iris are a large genus of hardy plants, in many splendid varieties, blooming from May to July. The dwarf (*I. Pumila*) has always been used as bordering for walks and flower beds.

The columbines are stately plants of different colors, single and double.

One of the earliest to bloom is our native *hepatica triloba*, a much neglected but desirable plant, the leaves are evergreen, flowers, single and double of various colors.

The hardy phlox is a large family, containing many species and fine varieties, blooming in early spring till autumn.

The pink has a place in our memories of the old-time gardens; their beauty and fragrance endears them to all; it is often used as a border for walks and beds.

The peony is a stately plant, adapting themselves to all situations; very suitable for borders in the back ground.

The spireas are very showy, blooming from June to September. Flowers white and red, double and single.

The Day lilies are very hardy plants. Colors—orange yellow, white and blue, blooming from June to August.

In the *Nerine* or Guernsey lily we have a very old favorite, beautiful in foliage and flower; when once established, blooming for years. Flowers, white; August and September.

The lark spurs are profuse bloomers from July to November. Flowers, deep blue and white; hardy, and of easy culture.

Asclepias are desirable plants with purple flowers, having the fragrance of the tube rose.

The *fraxinella*, an old favorite, esteemed for their aromatic odor, bloom in May and June.

The astelba is one of the hardiest of plants. Very largely used for forcing as a winter bloomer.

Yuccas are evergreen plants, with sword-like leaves, of a very tropical aspect and very desirable for the lawn. Flowers, white, on a tall spike, in July.

Campanulas, fox gloves, veronics and many others could be included in this list. Newer plants are discovered every year hardy and desirable in all respects.

Those desiring to plant have a very large assortment to choose from. We hope that our plant-loving people will regard with more interest these plants that thrive and bloom with so little care.

J. A. DURKES, Weston, Mo.

ORNAMENTAL TREES.

The value and pleasure there is in planting ornamental trees, vines and shrubs is not known by the people of our country and city. A few dollars and a little time spent in ornamenting our home with trees, shrubs and vines would add much value and pleasure to our homes; and as the trees, shrubs and vines grow, the value and beauty grows also. As we travel through the country, it is only now and then that we see any interest taken in planting ornamental trees, shrubs and vines. The country home varies from a bare yard; not a tree nor a shrub, but in their place some old machinery, an old wagon, a few plows, a pile of rubbish, a wood pile, and so on; then again we see a few old scraggy locust or soft maple, a few bushy fruit trees. Again a tangled mass of trees, shrubs, vines and fruit trees all in the front yard, and it is only 15 by 20 feet. Such a clustered yard is both unsightly and unwholesome.

I find the greatest drawback to planting of ornamental trees and shrubs is for the want of knowledge of what to plant, and how to plant it. I have seen places where they had a nice house built 15 or 20 feet from the road, with a high and heavy board fence in front, but not a tree or shrub to be seen. Had these men built the house 100 or 150 feet back, and taken \$25 out of the cost of the house and spent it in making a lawn, and planting some ornamental trees properly, it would have added value, beauty and pleasure to the homes.

And here I must say that if our horticultural and agricultural journals would give rules and plans, tell us what and how to plant and urge the planting of ornamental trees it would be a great help to awaken an interest in beautifying our homes, as there is always something to be learned in the planting of ornamental trees.

I for one have searched and looked all through the papers and books to find something on ornamental trees, but failed to find it. Much may be learned by observation as one travels through the country and the suburbs of the cities. If one passes by a nicely and tastefully planted yard he is sure to notice it and admire it, and right there one can get good ideas of how to plant. You can see for yourself and avoid mistakes. Nature is our best guide, and in planting a yard we should try to imitate nature somewhat, more so in large places or parks.

Most people plant trees in their yard about their houses only for shade, not considering the beauty at all, and shade is all they get, but it is more beauty we want; beauty first and shade second. In planting a yard care should be taken not to plant large and spreading trees too near the house, or in the front-yard. Slender and pyramidal-formed trees should be chosen for this, and the larger and spreading trees planted further back. Do not plant in regular order, but by all means plant in clumps or groups, leaving bare spots of lawn and a clear view from the house to the road or some distant landscape, hills or groves. Plant a clump of one kind here and a group of another there. A few different kinds may be grouped together as they show off to some advantage. Plant weeping trees by themselves in an open spot so that they can be seen from the road, the slender and pyramidal-formed trees should also be planted so that they can be seen by the traveler.

Roadside planting adds much to the beauty of our homes if suitable trees are chosen for a small yard, or where the house is built close to the road. More slender-growing trees should be chosen for large yards. We have many valuable trees growing wild in our forests, that can be had for the digging of them, and a few days spent in spring or fall with your family getting some trees, shrubs and vines, properly planted, is time profitably spent. The white elm, white and blue ash, soft maple, sugar maple, sycamore and horn beam can all be found growing in our forests. The elm, soft maple, sycamore, Carolina poplar are large growing trees, and should be back from the house or street. The white ash, the linden and sweet gum are good trees for grouping on the lawn or roadside planting. The lombardy poplar is a slender form, contrasting pictures yearly with round-headed groups of trees. The bolleana poplar is beautiful; it resembles the lombardy, and contrasts beautifully with other trees. The white birch and paper birch should be planted in groups by themselves, or with others, and by the roadside. It would draw the attention of the traveler. The cut-leaved weeping birch is a beauty in an open spot, not for roadside planting. Wier cut-leaved maple may be grouped with tall and slender growing varieties, is a fast grower and a good

tree every way. The weeping willow—everyone knows it—should be planted in an open spot in front of other trees, contrasting with the poplar and other trees. The tulip or white wood is one of the best of lawn trees for a front yard, and always attracts attention; good for single or grouping with other trees. The sugar or hard maple is one of our best, and one never makes a mistake in planting it in the front yard, on the lawn, by the roadside or in the back yard; in the pasture it is also useful. The ginkgo or maiden hair, a native of China, makes a good front yard and lawn tree; looks nice grouped with others.

Magnolia acuminata is the hardiest of the magnolia class; it grows to quite a large size and makes a nice lawn tree. The desidious cypress, a stately tree with small feathery foliage, groups beautifully. The European birch, a native of Southern Europe, is a good grower of pyramidal form and a nice lawn tree. The hardy catalpa is a good back-ground for the yard, as it contrasts well with others. We have a large variety of evergreens, but some of the largest are not suitable for a front lawn or small yard, but make pretty back-grounds. The Norway spruce, Scotch pine, Austrian pine, white pine and red cedar should be used for suburban grounds, farm yards and for the screen of unsightly objects, such as out-buildings and back-yards. It can also be used for ornamental wind-breaks for winter protection from prevailing winds. Great comfort could be obtained for man and beast by planting groups of these evergreens so they would shut off the prevailing winter winds, and would be a very striking and beautiful picture in the winter landscape. In addition to those named for a shelter belt, I mention the Am. Arbor vitæ and Siberian Arbor vitæ for ornamental hedge purpose; the white spruce and blue spruce, balsam fir for its compact growth, good for the yard, lawn and park; the hemlock, Lawson cypress and Japan cypress are good for small yards and lawns and for grouping, cluster pine, Globe Arbor vitæ, sawing juniper or low growing for small yards, the pyramidal arbor vitæ and Irish juniper are beauties and grow up slender like a green post. The Arbor vitæ elegantissima and Geo. Peabody are of rich golden color and contrast beautifully with the dark green colors.

A word or two and then I am through. Carefully take into consideration the ultimate size and spread to which your trees will attain. Do not plant too thickly; a clustered lawn is unsightly; few have the courage to take a tree out after they have grown it for some years.

F. C. MYERS, Greenfield, Mo.

The report of the Committee on Final Resolutions was read and adopted:

Resolved. That we, the members of the State Horticultural Society, tender our thanks to the Ivy Leaf and Orpheous Mandolin Clubs and the musicians of Springfield, who entertained us with both vocal and instrumental music, and to Miss Evans for the recitation which enlivened our exercises; also, to the Greene County Horticultural Society for their interest and assistance in making this session of the State Society a success; to the ladies of the local Society for the elegant banquet tendered the State Society and visiting delegates. We also appreciate the courteous treatment by the citizens of Springfield and thank the press of Missouri for their valued assistance; likewise the hotels of Springfield and the railroads for reduced rates.

GEO. T. TIPPIN,
J. M. STEDMAN,
F. H. SPEAKMAN,
Committee.

LAST DAY'S SESSION OF THE STATE HORTICULTURISTS.

The Fortieth yearly meeting of the Missouri State Horticultural Association is now a matter of history. It is safe to say the record, when it appears, will be read with proud satisfaction.

It was a success in every particular. There is nothing to regret about it—except that it is over and the welcome guests are gone.

Fortunate is the town that secures such a meeting. It stimulates and promotes an interest in horticulture, a fraternity that makes men and women more humanly in their sympathies.

The program has appeared in this paper, and it is not necessary to repeat it, suffice it to say, that it was carried out. President Evans and Secretary Goodman can take charge of a convention and not miss a cog in running the program through. The Society, indeed, is fortunate to have two so experienced and faithful officers. Another man that the people were glad to see at this Convention, was Judge Samuel Miller. He has endeared himself to the people of Missouri. He is not so old a man as we expected to see, judging from what he has written about being old. A great many were happy to shake his honest hand.

N. F. Murray is very popular in South Missouri, and our people were glad to strike palms with him. He honored Springfield by bringing his wife along, and President Evans and Secretary Goodman were accompanied by their accomplished daughters.

There were present also a number of prominent growers from different portions of the State, who by their interest in all the proceedings of the three days, contributed to the grand results.

Spraying was one subject of the many discussions. If the aphids, and all the insects' pests are not exterminated it will be because the fruit-growers do not do as advised, and if orchardists do not spray they will not have perfect fruit. Secretary Goodman's report was a

model, summing up the results of the year. His suggestions are all safe and wise, and if followed will surely add to the welfare of the people.

In the afternoon Miss Murtfeldt's paper on insect pests was read by Prof. Stedman. This gentleman is the entomologist of the Agricultural College, and right here, let it be stated, no college west of the Mississippi has a more earnest and efficient entomologist than Prof. Stedman. It is just as true that no other state in all this great west has so strong a professor of horticulture as our Prof. Whitten. The two young men are doing a grand work for the fruit-growers, and are anxious to do all in their ability to help Missouri and her institutions to the front.

Space will not permit the full record of the busy day's doings. If we could remember what was said in G. A. R. hall yesterday and put into practice, then there would be many transformations among the homes of Missouri, and it would not be long until this Ozark country would be in reality, the orchard, the berry-field and the vineyard of America.

The event of the last day was the banquet. The ladies of the Horticultural societies deserve great praise for this crowning effort in furnishing a dinner that (so our visitors said) was the best they ever sat down to—a dinner that was prepared by the ladies, not by caterers, that included many of the products that are grown to perfection in the Southwest, including big dishes of strawberries.

Fully 250 enjoyed the feast. Of course, this success cost work, and many of the ladies worked too hard, but there is this satisfaction, their liberality is appreciated and always will be.

After the dinner there were toasts, Dr. Hensley acting as master of ceremonies of the feast. It was not dry toast, for it was toast on fruit.

Col. Evans, N. F. Murray, Secretary Van Houten, of Iowa; Secretary Barnes, of Kansas; Rev. John Brereton, J. B. Wild and D. McNallie and others responded to the sentiments.

The regular session was resumed at 3 o'clock. Just before adjournment the peach-growers present organized an association for the purpose of handling and marketing the present crop of peaches. Col. Evans is president and S. W. Gilbert secretary. A meeting will be held at Mountain Grove the last Tuesday in June to perfect the organization. The object is of the greatest importance. South Missouri has the best peaches in the country this year, and, if properly distributed, will pay up a lot of incumbrances.

Secretary Goodman's report was, like all his papers, of great value in the facts and suggestions. It would be well if all in Missouri could read it, as his earnest words would surely have a good effect on many. At the evening session came some of the best papers of the meeting.

Prof. Kelley does some marvelous work on his violin. He was forced to appear a second time. The Ivy Leaf Mandolin club delighted the company, and several selections being repeatedly recalled.

The committee on resolutions reported the heartiest kind of thanks for their entertainment, and several, in seconding the resolutions, declared they were never treated better, and they would come again.

At 10 o'clock the session came to an end. The Republican and every citizen of Springfield hopes it will not be long 'until the Queen City is again favored with a State Horticultural meeting,—Republican, Springfield, Mo.



Actual Size.

GLORIA MUNDI.

Weight 28 ounces. Grown by Tom Marshall, Noel, Missouri.

16 $\frac{5}{8}$ inches circumference.



WINTER MEETING AT MOBERLY.



WINTER MEETING.

Held at Moberly, Mo., December 7, 8, 9, 1897.

The winter meeting was opened with prayer by Rev. Mr. Phillips of Moberly.

Music—Piano solo.

President J. C. Evans—There is no better evidence of the condition of the horticultural work in this State that the character and size of the audiences that greet us at these annual meetings in various parts of the State. Guaged by the assembly here before me, I am happy that we are able to say that we are in a better condition than we have been for years. We trust this will be a profitable meeting to you and to us. We know that we are welcome to your beautiful city; we are already satisfied of this, but we will call upon your mayor for an address of welcome.

MAYOR WM. J. CAVE'S ADDRESS OF WELCOME.

Mr. President, Ladies and Gentlemen—I am somewhat in the attitude of the small boy about to make his first speech. Some people think that a lawyer never has such a feeling; but your President told me that if I would make a good speech he would see that I was suitably rewarded for it. As he said this he looked toward those beautiful apples over there. So you see why I am afraid of losing the promised reward.

Technically, I know little or nothing of fruit-growing; but I doubt not wonderful progress has been made in the science and art in the last few years, and that fruit-growing is keeping pace with the march of progress in other fields of labor. Many of our people do not know what fine fruit is being grown right here in our own State. I am satisfied that agriculture, which embraces horticulture, is the basis of all true and lasting prosperity. I think that in fruit growing we are not behind any other state. Of course, California always makes greater effort to

advertise her fruit and push it to the front. If Missouri would make as great and systematic effort in this direction she would let the world know that she is one of the very first, if not the first, fruit states in the nation. I think her people are awaking to the fact that there is more money in fruit than in some of the cereals. Her land, as now half-way cultivated, sustains a population of two and three-quarter millions. It might support double the number.

I believe nearly all of this beautiful fruit now on exhibition was grown in this State. Much of it comes as a revelation to our people in letting them know what can be grown in the State. I hope this meeting will be pleasant and profitable, both to the visitors and our own people. I extend to you a cordial and heartfelt welcome to our city.

VICE-PRESIDENT N. F. MURBAY'S RESPONSE.

Ladies and gentlemen, in response to the eloquent address of welcome by your worthy mayor it becomes my duty and pleasure, as the representative of the State Horticultural Society of Missouri, to return to your honored mayor, who represents the good people of Moberly our sincere thanks for the cheerful greeting and hearty welcome you have given our Society to the hospitality and freedom of your beautiful city. We are not all surprised at this enthusiastic welcome, in fact we would be very much surprised to meet with anything else in any one of the numerous cities of imperial Missouri.

We trust that we have all gathered here on this happy occasion, not from any spirit of selfishness, but rather in the spirit of the Great Master and teacher of our race who came not to be ministered to, but to minister unto others. Horticulture is the most effective mode of tillage, whether the products are for utility or beauty.

Horticulture is of great antiquity, in fact it began in the Garden of Eden before the fall, when God commanded Adam to dress and keep the Garden, thus proving that man was to be an industrious being and not an idle tramp and vagabond upon the earth. The Greeks and Romans delighted in horticulture and to them we are indebted for many of our most useful plants. All civilized lands practice it with unflinching assiduity; within the last forty years it has advanced to a surprising extent in the United States, hence many societies have sprung up, and among the foremost of all, we find our own State Horticultural Society assembled here tonight after just forty years of earnest work to give you the light and benefit of our experience. While we are an intelligent people, both as Americans and

Missourians, yet there is room for improvement; the many failures to be seen here and there is an evidence that ignorance and superstition still lurks and lingers in some dark corner, but the time for guessing at things must soon pass away while ignorance and superstition must recede and fade out before the glorious morn of the day of exact knowledge which is now dawning upon us. It has been said that Jerusalem was destroyed because the education of the children was neglected, and yet a nation may give all heed to the training of the young and through a false philosophy of education only hasten the hour of her doom. What we need is not only a very high mental, moral, physical and religious training of our youth, but how to combine all these forces and carry them into practice so as to secure the greatest good to mankind in general. We should educate to more closely observe and better obey the great laws of nature which God has given us for our good and cannot be violated with impunity without suffering the fearful consequences. Individuals suffer and nations perish for a correct knowledge and observance of these great laws.

As horticulturists, the time has come when we should be doing all in our power to prevent the destruction of our birds, our friends, given to us to protect our fruits from destructive insects. We should also seek to awaken a more earnest sentiment in opposition to the destruction of our forests; already our once grand white pine forests are gone; twenty years more and our hard pine will be used up; our black walnut has been cut and cleaned up, and every twenty four hours thirty thousand acres of American forests go down to feed the remorseless jaws of commerce; we have cut down our chesnut, our pecan, and other nut-bearing trees to make room for more corn, and import vast quantities of nuts that we could and ought to grow at home; we already begin to see the evil effect of the destruction of our forests in the unprecedented, destructive floods followed by burning drouths. We are not pessimistic in our views; already the American people have seen the danger, and many are planting groves and forests for timber, and our horticultural societies are earnestly engaged in the increased acreage of orchards and in educating the people to a wider and more constant use of good fruit. A Catholic priest once said to his congregation, that it would be far better for their souls if they would eat less pork. I beg to improve on that by saying yes, and for your bodies, too, and eat more fruit for the good of both. An old Scandinavian tradition represents the apple as the fruit of gods, who, when they felt themselves to be growing feeble and infirm, resorted to this fruit for the purpose of renewing their powers of mind and body. It is a fact proven by analysis that the apple contains a large percentage of phosphorus,

and is admirably adapted to renewing the essential nervous matter of the brain and the spinal cord.

Some statistician has computed that in the United States 2,250,000 pies are eaten every day, and each year 819,000,000, at a cost of \$116,000,000! Now, just think of the time spent in making these expensive luxuries, and of the tired, weary women who make them; of the host of lean dyspeptics caused by their use, who have no appetite for wholesome food, who spend sleepless nights, grow prematurely old and die, when they should be in the prime of life. Think of all this evil, and, as a remedy, cut down three-fourths of the pie counters and in their place use more freely of the rich, luscious, bloom-dusted, life-giving fruits, fresh from the lap of good old Mother Nature.

Is there any danger of eating too much? No, not if it is good, ripe fruit, eaten regularly; the danger is in eating too little. Right here in our own State, which stands third in the production of fruit, many farmers are buying their apples, more are doing without, and only a few are growing a full supply of standard fruits and berries. If all the commercial orchards and berry plantations of Missouri were evenly distributed among the farmers, and all would use the fruit freely, as they should, there would not be enough for home consumption. Occasionally I have had men tell me they did not care for the finer fruits, such as strawberries, but I felt sure it was only because they were too lazy to grow them. You couldn't afford to trust such a fellow in your strawberry patch; he would eat a peck at one feed.

But some one may raise the question, is there not danger of over-production? No, not one iota have we heard of it from boyhood. It is the old hobby-horse that has been ridden by a few pessimists for the last forty years, and they will continue for all time to come and shout themselves hoarse on over-production, notwithstanding the fact that there has been a large increase in orchards in the last forty years, yet the demand is greater than ever, and the average price higher than it was forty or one hundred years ago, and the owners of large commercial orchards this year found themselves in possession of a Klondike mine without the perils of a trip to Alaska. The limited area of successful fruit-producing countries, the opening of foreign markets, all the orchards to be replaced at least once in every twenty-five years, the vastly increased consumption of fruit brought about by rapid transit, and better methods of packing and handling, to my mind, preclude the possibility of over-production. In one day the past season twenty-eight car-loads of California fruits were sold in the New York market. A few years ago it was thought remarkable when two or three car-loads of this fruit was sold in the same market. That

fruits can be sent 3,000 miles by rail at high freight rates, and sold at a profit in a market where fruit-growing is eminently successful, is indeed remarkable.

In Missouri we have the most favorable conditions for profitable fruit-growing of any country on the globe; our fruits lead all others in size, color and quality. Last October our Missouri Ben Davis were selling in Hamburg, Germany, at \$6 a barrel, and they had taken as many up to that date as altogether last year. We might increase our orchard planting in Missouri three fold with great profit to our people, and along with it we should increase our poultry to five times what it is at present, as a matter of protection to our fruit. The poultry product for this year exported out of Missouri amount to \$7,000,000. This showing is very good, but there is room for improvement. Last year we imported 1,000,000 dozens of eggs, 130,000 dozens were imported from China just to make sure of freshness. I wish to emphasize the importance of the poultry industry in connection with horticulture, because the distribution of poultry throughout the orchard is the most natural, easy and successful way of producing perfect fruit. The droppings of the poultry will help to keep up the fertility of the land, and the eggs, if sold, will add to your daily cash account, and for eating will certainly be preferable to those imported from China or from Canada.

The time has come when many of our fruit-growers may find it profitable to grow sugar beets in their young orchards. Experiments are being made, and we will know more about it in the near future. One thing certain, we should encourage this new industry all we can. Each year we send one hundred millions of dollars out of the country to pay for imported sugar, and when we have sent over the ocean enough wheat to balance the account, we have sent out sixteen millions of dollars of the fertility of our soil that never comes back, as the sugar all comes from the air. It is time we were converting American air into sweetness by American labor and thus retain one hundred millions of dollars in cool cash among our own people. We should encourage the planting of parks, public grounds and highways to trees, and in place of so many forest trees that produce nothing but leaves.

We ought to plant more of the nut-bearing trees, also cherry, Keiffer pear and persimmon. But in order to carry the horticulture of Missouri to a higher plane and achieve more satisfactory results, we must educate our people up to a higher practical knowledge, of all that relates to horticulture from start to finish. As wide awake progressive horticulturists, we should select and breed our fruits to fill the place we desire. We should always keep in view size, color, quality,

keeping and carrying qualities of the fruit, and last but not least, the hardiness and productiveness of the tree. A thorough knowledge of our profession and close attention to details is the only sure road to success. We are proud to know that we have a School of Horticulture in our State University, the only one so far established on the American continent; and in addition to the regular course and in order to accommodate the farmers' sons and daughters and those of limited means and encourage them to secure a practical training in horticulture, a short course of thirteen weeks, beginning the first Monday in January has been provided for, free of tuition. In this school not only daily lectures will be given by the most experienced horticulturists in the State, but practical lessons are given in grafting, budding, pruning, grading and packing of nursery stock, growing trees and shrubs from seeds and cuttings; every county in the State should send one or more students to this school the coming session. Time is too precious and life too short for us to continue to grope our way in darkness; the world is moving rapidly on and we must keep step to the march of progress, or be left as stragglers in the rear to be gobbled up by our enemies. In conclusion we thank you again for this hearty welcome and extend to you a cordial invitation to attend the sessions of our meetings and participate in the discussions, lend us a helping hand to carry this grand work onward and upward 'til all the wild lands of our State are converted into happy homes, fruitful fields and orchards and many thousands are made happy by the increased comforts of life and stout and healthy from eating all they want of the rich luscious life-giving fruits of imperial Missouri. N. F. MURRAY, Oregon, Mo.

Music—Vocal solo.

HARDY BULBS.

When the request reached me asking for a paper on "Hardy Bulbs," the shadow of a smile hovered around my lips for some time.

The request seemed to say to me in peremptory voice, "Now, Madam, let us see you get any sentimental nonsense woven into this subject," and I must say the title did somewhat alarm me, but one evening when all alone in my study, I took in my hand the rough-coated bulb of a Bermuda lily, closed my eyes, put my ear to its shaggy surface and listened for the beating of the life that I knew was hidden away in its white heart. Listening thus, I seemed to see a great garden unfold before my vision, and in this garden were only beds of hardy bulbs. It was early spring time, and snow was yet lying in the fence corners, where drifts had been, but close up near the garden

enclosure, where the morning sun could smile fall in their faces, there was a graceful border of giant snow drops that had been there years and years, multiplying and giving beauty to an otherwise bare and neglected spot. Along the grass borders, between which ran the smooth walks, there were hundreds of crocus blooms in all the delicate and wonderful butterfly colorings of their richest species.

Some were snow white with faint veinings of royal purple, others deep, rich and dark, shading up to the tenderest tints of lavender, while still others were yellow as gold and silken as floss, each vying with the other in its effort to beautify the days when flowers are shy and rare. My imagination led me to that garden a few weeks later, when I found the spiraxias, grape hyacinths, ixias, tritolias, and lilies of the valley in bloom. How my soul reveled in the intoxicating perfume of all these fragrant blossoms. A little later there came a veritable color melody of narcissus, tulips, hyacinths, and the wonderful Japan iris, with blooms more delicately beautiful than almost any others of the hardy bulbs, except only the lilies. And when the lilies came! Ah, what grandeur filled the garden; one felt that to walk there one should wear robes of white, and golden bells should be tinkling from every tuck and hem of the shining garment, to harmonize with the heaven-sent beauty of all the royal family of lilies.

See them in their perfect tintings—scarlet, crimson, white, yellow, striped, mottled, flecked with soft falls of color that barely seem to touch the petals as they cling, ready to fly away at a touch. Ah! it is too lovely to write about! To really enjoy this banquet of beauty, one must invest generously in lily bulbs. Get all of them if you can, then mass the colors to suit your own taste.

The iris family, known as “flags,” is graceful and beautiful; they bloom early, last for years, require no care after once planted, and are something no garden should be without. What ails my Bermuda lily bulb? Has it grown weary of my poor attempts to paint the lily, and gone to sleep? I fear me so, and shall have to descend to plainest prose, now that its inspiration has deserted me.

To have the snowdrops, the ixias, sparixias, the tulips, the hyacinths and others above named of this interesting collection of bulbs, requires fall planting. In this climate, October is the best time to put in bulbs. The beds must be made of rich, loamy soil, and *no* manure must come in contact with the bulbs, or they will decay; but when the ground begins to freeze a heavy coat of compost from the stables may be put over them, to be raked away as soon as the frost leaves the soil in the spring. A German gardener once told me to plant all hardy bulbs twice their own depth (in autumn planting), saying that this was

his rule, and one that had never disappointed him. In planting hardy bulbs devote generous space to the narcissus ; they are such grand, earnest, sweet-smelling things—modest, too, notwithstanding their strength of limb and their heavenly perfume. One ought to be able to say more for this bulb, as it is called “the poet’s flower,” but my inspiration sleeps in the heart of a lily, and all I can add to the theme is this prosey statement: A lawn or garden without hardy bulbs looks barren and unlovely long after the blue birds are here, and the leaves have come out to see how the world looks this year, and the grass has reached every possible corner for blossoms to brighten the sameness of its costume.

We may as well get all the joy we can out of the beautiful things God has given us, and there is more real loveliness and sweetness hidden away in the spheroid form of a bulb, waiting to be tucked away in soil that is moist and rich, than can be found in any other form of plant creation.

Oh, wonderful life, from the soul of love,
 Wonderful gifts from the hand above;
 Wonderful sweetness lingering long
 Like whispers soft of an angel’s song.

Blossoming things in a world of sin,
 Living with us in the mad world’s din,
 Loving with us the sweet mercy of God;
 Lifting bright faces—like souls—from the soil.

OUR USEFUL BIRDS.

I am afraid the title of this paper promises more than I can keep. To speak of every one of our useful birds would take more time than I have at my disposal, since 99 per cent of the 300 different kinds of birds that visit our State are useful in one way or another. Every bird that is not positively injurious must be regarded as useful, if for no other reason than for the beneficial influence which the mere presence of the cheerful creature exerts on the mind of man. We are not always aware of this influence, because we are so much used to it, but its absence is felt by everybody. What would country life be without the birds, with no birds on its broad fields, no bird song, no life in the trees, no birds in the air, no return of joyous songsters and dear old friends in spring?

Even of the few species of hawks, which live mostly on smaller birds, and are, therefore, regarded as unquestionably injurious. I am not convinced that they do not perform some good offices in the household of nature. It is said they do great damage; but did they

not do the same thing for ages, and birds were plentiful, much more plentiful than now, when these same hawks are becoming scarce through constant persecution?

It is indeed not so much the farmer as the hunter who sees in every hawk a chicken thief, and it is simply a case of envy; he would not care so much about the farmer's chickens if the hawk did not once upon a while tackle a little of the game, which he thinks belongs to him alone. It is obvious that the hawks do not, as a rule, capture the most active, the most vigilant, the swiftest individuals, and they seem to serve a purpose by weeding out the weak and the sick; and whenever I see an old sick hen sitting around, perhaps suffering pain, I really wish some kind-hearted hawk would take pity on her.

Then there is another thing to be considered: Suppose the bird reared in the solitude of the forest, marsh or mountain had no enemies at all in those regions; would they not grow up in a state of the most stupid and dangerous confidence? The first step into the haunts of civilized man, with his army of prowling cats and cruel boys, would bring disaster, and the slaughter, already great enough, would be immense. As it is, through the kind co-operation of these much-maligned hawks, even the fledglings, as soon as they leave the nest, are taught by their parents the unremitting vigilance, without which they could not successfully perform their annual migration.

Man is much too short-sighted to see into all the details of cause and effect in nature's wonderful household, and until we have learned more of them it will be best to disturb the existing equilibrium as little as possible.

It is strange that with all our boasted civilization the destructiveness, a remnant of the savage animal nature in man, has not been more subdued. I regard it as a deplorable deficiency in our education that the churches and schools do not teach the sacredness of life. They preach love, several kinds of love, and lots of it, but none for the birds; they preach love for God, but none for His works, which we see and admire. They preach pity, and all claim to be pitiful, but how can a human being with pity in his breast kill an animal for the sport that is in it?

It is true that organic existence is a continual war; one life rises from the death of another; one organism feeds upon another; the smallest as well as the largest are in constant warfare, and man himself is forced to kill for the sake of self-preservation. But if he stands as high above the animal as his superior reason, his sympathy for his fellow-creatures, his pity, his sense of justice and his magnanimity claim for him, he should be careful to take no more life than he can

help, and whenever he is in doubt about the necessity of killing, leave the benefit of the doubt to the poor, dumb creature that cannot defend itself. When you are not perfectly convinced that the crow, the black-bird, or any other bird on your field does any harm, don't disturb it. There are birds that may do a little harm for a short time but incalculable good all the rest of the year; I would say, be forbearing and indulgent with them.

But I want to speak now of a bird, which never does any harm, and I suppose everybody recognizes in this picture the well-known meadow lark, though not everybody may know that it is one of man's best friends. In fact, there is no more useful bird on the fields of Missouri farmers than this meadow lark, and it is an eternal shame that this bird is on the list of game birds.

From earliest dawn of day till nightfall this industrious bird is walking over our fields and meadows to secure the noxious insects, and where our eyes would look for them in vain, the meadow lark finds a sufficiency in every month of the year. It is one of the earliest insect-eating birds to return to us in the spring, and it stays longer with us than most others, thus working busily in the interest of the husbandman for nine months of the year. Some even spend the whole winter in our fields, and it may be assumed that many more would remain if they would find the protection which they so richly deserve, instead of the foolish persecution by which a few ounces of meat are gained at the expense of bushels of grain and tons of hay.

The meadow lark's principal food is grasshoppers and crickets, and she finds them throughout the year by her assiduity in inspecting every cranny in the ground, turning over every leaf, and searching incessantly through vegetable debris wherever insects find a hiding place. It is highly amusing to watch her during these proceedings, for, like the orioles, black birds and other members of her family, she is very clever in the use of her long and pointed bill. Watch her, for instance, when she wants to inspect the contents of a rolled-up leaf; see how she inserts the closed bill into the roll and by slowly parting the mandibles opens the leaf far enough to expose the interior and extract the insect.

Years ago I found once a meadow lark shot through the wing, unable to fly, but otherwise uninjured. I took her home and kept her in a large cage for seven years. It is one of the most amusing pets one can get. When not singing she tried to keep her bill busy all the time. With a crumpled-up piece of paper she could play a whole day. Of course, she preferred insects to every other food, and did not refuse the oldest, driest grasshopper. But she could also catch and

subdue the liveliest of its kind, pulling out its legs one by one, then the wings, removing the tobacco spit, and after breaking the bones she gulped down the whole body. The hairriest caterpillar was not too hairy for her. She worked it and rolled it on the ground until all hairs were gone; then she moved it through the bill from one end to the other to get rid of unsavory contents before swallowing it.

Unlike most other insect-eating birds, which can only be with us for four or five months of the year, the meadow lark is, fortunately, not entirely dependent on insect food; in its absence she can sustain life on vegetable food, such as weed seeds, and I know of one which devoured a whole nest full of young mice, exposed by the removal of a cornshock from the field in mid-winter.

While most people are only too ready to accuse birds of wrongdoings, no one has ever found fault with the meadow lark. She will eat a few scattered seeds of grain, if pressed by hunger, but at the time of the sprouting corn there is too much insect food to be had to believe that she does any appreciable harm. Hard food is always rejected. The one I kept refused corn; did not know what to do with it; but she partook of all sorts of soft food, from beefsteak to mashed potatoes; in fact, she ate nearly of everything we had on the table. In the absence of sufficient insect food she got every day her regular fare of scraped or finely cut raw beef, a dish of which she never tired.

But the meadow lark is not only beneficial through the destruction of noxious insects, it is also a very sweet songster, and our fields look twice as promising and the sunshine twice as bright upon them, when her familiar notes float through the air. And how she cheers the weary plowman after a long and hard day's labor!

In our State two kinds of meadow larks are at home. The ranges of the eastern and western meadow lark meet here, and the latter is even a still better songster than the former; its song is more melodious and comparable to that of the woodthrush. That such a bird, an insect-eating singing bird, is considered a game bird and killed by hundreds and thousands every year is really shameful! Our farmers and horticulturists should take up the fight for its protection immediately, and should not cease until a fine of twenty-five dollars is put on every meadow lark killed on Missouri ground. The shooting of innocent and useful birds has gone on too long already, and should be stopped by all means.

The city folks won't do it; the country population must do it. It is in their interest; they need the birds to help them keep down the insect pests, and they want them to cheer the lonely fields and silent woods.

We do not only want laws protecting birds, we want protection itself. Laws, if not enforced, are no protection. The strict enforcement of the laws can do a great deal of good, though it can of course not stop all at once that inveterate desire for destruction, which has such a strong hold on our people, and which is so widespread that it amounts almost to a national disease, bordering on mania. It will take generations to cure it, as it can only be cured by the slow process of education.

We have to teach the children to be kind and merciful to all our fellow-creatures, and above all to be just. We have to tell them that other creatures have as much right to live as we have, and that we should shrink from the killing of harmless animals as from the murder of man. Life should be held sacred. If we could educate this into the heart of the children, there would not be so many murderers. Finding pleasure in taking life, as shooting birds, makes them heartless and cruel. It certainly has no refining influence on the morals of the youth; it seems to be out of place at the present stage of civilization, and must be in the way of progress toward attaining a higher and more generally spread culture.

At any rate, let us not be ungrateful. We owe much to the meadow lark for the good services performed. Let us secure for this most useful of birds and loveliest of songsters the protection which she deserves. Let us not rest until she is removed from the list of game birds and placed where she belongs, among those best protected by law and the good will of man.

O. WIDMANN, Old Orchard, Mo.

DISCUSSION OF BIRDS.

Q. Is the raincrow the same as the cuckoo? and does it put its eggs in other birds' nests?

Mr. Widmann—It is, and sometimes its eggs are found in the nests of other birds, but this is very rare. Its regular habit is to make its own nest.

Q. When was the meadow lark first classed among game birds?

Mr. Widmann—It has been so classed for 10 years or more.

Q. What good is the cedar bird?

Mr. Widmann—It steals some cherries I know; but we cut down their wild cherries, of which birds are very fond, and now they must have some of our cherries as pay for the destruction of theirs.

Q. What about the English sparrow?

Mr. Widmann—The English sparrow is no good, but I doubt that it is as bad as some think it. Some say it drives other birds away,

but I have many other birds as well as sparrows. I take the sparrows' nests from our bird-houses so as to let the martins in. Other birds have the habit of driving away the birds they do not like. The little wren throws the eggs out the martin's nest.

J. C. Evans—Every bird that will lie in cover and impart its scent to the dog is classed as a game bird.

A member—Mr. Widmann expresses my sentiments. There is not a bird in our country that should be killed. I hope the good work of protecting the birds will go on.

Mr. Periam of Illinois—The farmers themselves are to blame for the birds being killed. No man has a right to shoot the birds on my farm. The farmers do not understand that it is in their power to prevent all trespassing upon their grounds. There is only one bird that feeds its young on anything but insects. Even the sparrow feeds its young on insects. In the winter they eat the eggs of the insects that would hatch out in the spring and increase to many millions. If we cannot allow the robin, for instance, to take a few berries, we ought not to have any berries. We are now hunting the world over for something to spray with to prevent the ravages of insects, yet we allow the destruction of the birds which are nature's remedy for insects.

J. C. Evans—The great bird destroyers are the town boy with his first gun, the negro and the dago.

N. F. Murray—I recommend planting the Russian mulberry to grow bird food. It is fine for this purpose. They prefer it to cherries, and it has a long season. It is also splendid post timber. Every farmer should plant a little grove. Town boys in all parts of the country are continually hunting everything they can. If we can stop the destruction of birds and have plenty of poultry in our orchards, I think we can grow fruit in abundance.

Mr. Chandler of Kansas—Many boys have a custom of hunting birds' nests. I would like to see a law to protect birds and fine these marauding bands that roam over the country. The State Society should take the initiative in a thing of this kind.

J. C. Evans—I have something to do with the Olden fruit farm. I am lord over 2,000 acres so far as birds are concerned. The boys started to capture the birds. I forbid the troubling of birds' nests or the killing of birds. I threatened to prosecute any who killed birds and to dismiss them from employment. I do not allow a quail shot. They are becoming very numerous and very gentle, and we think we can discover that insects are growing scarce. I say this with pride, but I think it is commendable.

Music—Vocal solo.

HORTICULTURE ABROAD.

Methods differ so much in the different countries of the world that it is impossible in a short article to give a clear conception of conditions as they exist in many countries, and so only an attempt will be made to give glimpses, without any attempt to go into special detail as to crops, varieties or methods.

In the Hawaiian Islands citrous fruit grows in great abundance and perfection, while some of the fruits common to Missouri will succeed. Grapes only do fairly well, while strawberries seem not to know when to ripen. The weather is such that there is but little difference as to when things should be planted, and, with irrigation, which is necessary for best success, plantings can be made at any time. The beauty of the foliage, with the great variety seen, convinces a visitor that this should be the horticulturist's ideal country for fruits and flowers. Oranges, lemons, tamarinds, mangoes, pine apples, figs, bananas, limes and all fruits of that class thrive wonderfully, while bread fruit, ohao (the native wild apple of the Pacific islands) and many other fruits abound in great quantities. The guava grows wild on the mountains and is nutritious and refreshing, while the ohao and wild strawberries as well as many other berries abound on some of the islands and are very gratefully eaten by those who travel in the unfrequented parts of the country. The plenty with which nature supplies these fruits prevents their cultivation, but they could be domesticated and some of them would be highly valuable for their country, but is doubtful if they would succeed in the central parts of the United States, for it seems that volcanic soil is necessary to their best development. The very great variety of fruits grown prevents a demand for others that would be considered valuable if they were more needed. The Hawaiian Islands are infested with many enemies to the fruit grower, mostly imported, for in former times there were few enemies of any kind. The climate is such that it will be easy to rid the orchards and fruit plantations of insect pests, either with insecticides or with parasites. The last remedy was the popular one and was being tried with great hopes of success when I was there, and have learned since leaving that success is crowning their efforts.

The floral beauty of the Hawaiian Islands is beyond conception of those who have not been in the tropics and beyond description without the assistance of the artist, so no attempt will be made to give a word picture of the beauties of their trees and plants. But there is a vari-

ety of coloring on the same tree or plant that surprises all new-comers to that country and is a source of constant delight to the beholder.

Japan has a wonderful and beautiful flora. The vivid green of the trees, the large number of evergreens, and many of their trees are (like all of the Hawaiian Island trees) evergreen, while the earliness and long continuance of the bloom is a constant wonder to an American. Fruit trees begin blooming in Japan in January and February, and each particular tree or bush continues so long in bloom and has such a succession of flowers as to be wonderful. Ice often forms on the east coast to the thickness of an inch in the latter part of winter, and the snow may fall and lie on the ground for days together, and yet the blossoms of fruit and other trees seem to endure it without serious injury. One of the mysteries of the Orient is that the flowers have little or no perfume, and the fruits, as a rule, are deficient in flavor. Their apples and pears come under the rule and are nearly worthless to those who are used, as we are, to the best that grow on the earth. Their oranges do not come under the rule, and are a decided exception, for they are very fine, especially those little, flat varieties that are grown so plentifully about the inland sea in the southern part of the country. They are generally seedless and the rind parts readily from the fruit, and it is easy to break the orange up into sections without any juice breaking out, and yet these oranges are among the juiciest and very best grown anywhere. Pears in Japan are grown on trellis, but of the overhead kind, and about eight or nine feet high. They use cherry trees for park trees, and it may be said in passing that the Japanese are among the best horticulturists of the world, and the painstaking care that they give to their trees and plants merits the great success they secure. The Japanese are passionately fond of trees and flowers, and very few families fail to have them, even although not on the ground, for some of them live in upper stories of houses, and yet with roofs, windows and shelves, they manage to have fruits and flowers, and the many dwarfs that they have in both fruits and flowers enables them to have a variety beyond anything that would be possible in this country. It is not uncommon to see there a tree in full fruitage that is in a four-inch flower pot and less than two feet high and not having a spread of more than one foot. Of course, not much fruit can be grown from such diminutive specimens, but the pleasure of growing them is out of all proportion to the size of the trees or the bulk of the crop. Not a branch or leaf that is unnecessary to the health and vigor of the tree is allowed to grow, and, without scientific education, these Japs are good horticulturists. In other words, they are intensive rather than extensive workers and the results of their labors are

productive of much pleasure and some profit. It was a constant wonder to the writer to find among the Hawaiian Islanders and the Japanese such a passionate love for flowers, and the Japanese almost venerate trees, and the tender care and skill displayed in the growing of trees was worthy of more profitable results, for in that country the idea of profit is very much below our estimate of profit, for if the laborer there can save a few dollars a year he is satisfied. A tree that is blown over by a typhoon is carefully examined, and if life is left, it is staked up, even if in a park, and left to live and produce fruit and flowers until it dies, and the careful manner in which the work is done shows that they have a regard for the life of the tree that shows great appreciation of the value.

The Chinese are too utilitarian to secure much in the way of ornament, and so we do not see much except in the way of fruits for consumption and sale, and the esthetic part so observable in Hawaii and Japan is almost wholly wanting. Even the European and American residents of Southern China, where, with care, much could be grown, seldom have much in the way of adornment, and little in the way of fruits for the table, preferring rather to buy of the people further south and from the islands of the sea rather than to produce the fruits needed. Bananas are grown and eaten for the reason that they are a cheap article of food. The Chinese being a thoroughly practical people, in their way, they live on that which will sustain life at the least cost, and so horticulture does not play an important part in their agricultural operations.

In India nature does about all that is done in the horticultural field, and it seems ever a rule that where nature does so much the people do but little. Generally there is a plenty, for nature is generally kind, but in seasons of scarcity then famine ensues. In India, as in Hawaii, everything is evergreen and a long, very long, season of bloom and almost continuous crops of fruits follow, and fruits become an important part of the daily food. The possibilities of horticulture in the tropics are not easily measured, but it is an undoubted fact that little systematic work is being done, and there seems little prospect for any improvement, for the climate, or the laziness of the people, or some decree of fate, seems to say that where labor is unnecessary little work is done. And yet the people there do work and work hard at times; but to plant trees would require work to be done for a time so long in the future that the individual does not seem to think that he will live to enjoy the results of his labor, and consequently he toils not, neither does he spin (for he goes naked and consequently he does not have to spin), and yet he is surrounded by the beauties of nature to such an

extent that we might envy him his opportunity, if we do not envy him his self-satisfied condition of laziness. But if he is satisfied with his condition we should be, unless his hungry cry makes us restless, in which case we may contribute for his relief; but if we were no more industrious and provident than the people of India are, we would all die within a few years. They have a country that has no superior in natural resources, and the horticultural possibilities of India are practically without limit, for they have a variety of fruits that would please the taste of an epicure, and in such abundance and of such quality as to make a considerable portion of their food, and yet they suffer and die of famine when the store-houses of nature fail them.

Africa differs in some particulars from India, but the people are more industrious and would be more provident were it not for the prescriptive policy of the government. Turkey rules Egypt with an iron hand, tempered by Britain's mercenary motives; for Britain finds that dead men are not wealth producers. But the tax exactions fall so heavy on every industry as to crush out and destroy, and when we think of the wonderful tyranny we should not so much blame the people of Egypt because they are mostly thieves or beggars. Horticulture suffers from taxation to such an extent that the industry is growing less and less important, and yet there would be wonderful possibilities for fruit-growing in that country. The date palm alone would make an amount of fruit that would be a valuable export product. Bananas, citrons fruits and even apples grow, but the apples are of poor quality, lacking in flavor and keeping qualities, but there is not much variety in the fruits and yet many kinds would succeed wonderfully if there was any inducement to plant, and any prospect that the growers would be allowed to enjoy the fruits of their labor.

Western Asia has many natural flowers, but few cultivated ones. Many orchards and wonderfully productive. The olive (oranges at Joppa and a few other places), the fig, apricots and other fruits of that class thrive wonderfully, and in grapes they excel most of the countries of the world. Here too, taxation depresses, but not quite so much as in Egypt, for there it destroys, but in Palestine it only depresses and taxes to a heavy amount. But the wonderful yield of fruit from tree and vine passes the conception of these who have never seen large crops, such as are grown on the hills of Western Asia. Many of the plantings are small, some in the valleys, but mostly on the terraced slopes of the hills and mountains. These Arab farmers or *felas* are wonderfully utilitarian, and no esthetic notions enter into their horticultural operations. They work without system, it is true, but judg-

ing by results we should not find fault with them, for, while they escape some of the burdens of the Egyptians, they have much to contend with in the way of burdensome exactions of government, for the whole system of Turkish government is a system of repression and robbery, and yet when we consider the wonderful crops that the trees bear, the long life and health of the trees, the utility of all the things that grow, for even the trimmings are utilized for fuel, we must begin to conclude that if these Asiatics are not scientific they are successful. But they have to succeed or die in the attempt, and even success adds but little to their material advantage so far as accumulations are concerned. But this subject is too extensive for full discussion; neither will the proper limits of this paper allow a discussion of European horticulture, where much of interest awaits the enthusiastic investigator, but will close this rambling paper with a few observations or comparisons.

Missouri horticulturists may expect some good things from Japan, especially in ornamental trees and shrubs, and some of their fruits are worthy of trial, and even the Japanese bamboo may stand in Southern Missouri, and if it will, will prove very valuable. From Western Asia you should be able to get vines and trees that will be valuable, but if you are not able to get any other valuable thing from the people of other countries, you may be able to draw some valuable conclusions from your condition and theirs, by comparison. You have cold weather in winter, blight, mildew and insect pests in summer, with borers and damage from mice, gophers and rabbits and there is liability to light crops and failure, but you are sure of the crop if grown, for here the laborer secures the reward of his labor and there are none to molest and make him afraid; the tax gatherer may call but he cannot oppress, for there is a limit beyond which he cannot go. Here we have pleasure in the results of labor, and look on the results as of more than the mere money value, for with stable government, with hope and confidence in the future, we may plant and plan with reasonable expectation that those who come after us may profit by the labor that we do, and that our fellowmen may be blessed in the results of that labor. In many countries of the world there is little hope for the future, no confidence, either in the present or the future, and little incentive for action, for we find that when nature fails to yield her expected increase that hunger and starvation ensue. Here in the United States the pleasant summertime may pass, the frosts and snows of winters may come, and even the blizzard may sweep over the land, but with the preparations that we make we can laugh at the storm and cold and feast on the good things that the Great God has given us. The unthinking

might conclude that we were less kindly dealt with than the people of other lands, but when we compare our condition with theirs, we must conclude that our condition is much better than theirs, and that which might at first, or to the unthinking mind be considered a curse, we find to be our greatest blessing, for our very necessities but stir us up to greater energies, and with our gardens, our orchards, our fields and farms we have opportunity to raise all we need and to spare for the necessities of others less fortunately situated or less provident than we are. So let us take courage and preserve; let us congratulate ourselves that we were placed in a place that requires labor and painstaking care to succeed; let us praise God for the many blessings that have come to us, not the least among which is a stable government and the right to enjoy the results of our labor.

GEO. H. VAN HOUTEN, Lenox, Ia.

WEDNESDAY MORNING.

Meeting called to order by President Evans.

Prayer by Rev. Ward.

Music—"Swanee River"—By Boys High School Chorus.

The chorus, accompanied by violin and piano, was enthusiastically encored.

The President introduced the following delegates from other states: Wm. J. Barnes, Kansas; J. W. Stanton, Illinois; W. M. Bomberger, and A. Branson, Iowa; L. H. Reid, Wisconsin.

To the Missouri State Horticultural Society:

GLENWOOD, IOWA, November 5, 1897.

GENTLEMEN—This will introduce to you Mr. W. M. Bomberger, Treasurer of our State Horticultural Society. He comes among you as a delegate from our state society.

F. M. POWELL,

President Iowa State Horticultural Society.

OTTUMWA, December 2, 1897.

This is to certify that Mr. A. Branson is appointed by the Southeastern Iowa Horticultural Society a delegate to the Missouri State Horticultural convention at Moberly, Mo.

C. W. BURTON, Secretary.

FRANK O. HARRINGTON, Chairman.

Barnes of Kansas—Mr. President, my feelings have been wrought up by the singing. I see the "Star Spangled Banner" and hear the strains of "Dixie." It reminds me that horticulture knows no political lines, no state lines or anything of that sort. I can imagine a bird's nest built on the line between Missouri and Kansas, so that the young in one side of the nest would be in one state and those in the other

part of the nest would be in the other state. Would there be any difference in the development of the young birds in that nest? So there is no difference in the horticulture of the two states caused by state lines. I have been told that Kansas is the home of all the isms and cranks. There may be something in it, but you all know a good many good things that originated in Kansas. I always find that behind horticulture there are pleasant homes, and love of home is one of the best things in this life. If we are satisfied with our homes we can do better work, whatever may be our calling.

I am glad to be with you and I hope to learn a good many things from you. I invite you to attend our state meeting at Topeka. I thank you for the chance to talk of our fraternal relations, and unless something prevents you can count on my being with you in the future.

J. W. Stanton, of Illinois—I do not care to talk much at this time. I came to learn. I find that when a man gets to the age of your president, he finds he has not learned much about horticulture. New things are coming up every day, numerous insects are coming to the front and new ways of fighting them must be studied out. I believe we can learn by concert of action to combat these things better than we can alone. I expect senator Dunlap here before the close of this meeting, and he will tell you something of our condition and progress in Illinois. I am glad to be with you again. You have a much better meeting this year than last year. I realized last night when I arrived that you were having a good attendance, for I could not get a room in town, but had to sleep on the banisters.

W. M. Bomberger, of Iowa—I extend to you the cordial greeting of the Iowa State Society. We sing the same songs in Iowa you do here. Thirty-one years ago my father sold a farm in Iowa and came to Missouri. I revisited the farm yesterday. I am comparing the condition of things here in Missouri now and in 1866; but it would take too much time to speak of the great changes which have taken place in that time. I fear you do not fully realize your advantages and the great opportunities here for future development of horticulture in Missouri. I began fruit-growing in Iowa fifteen years ago on five acres. I now have one hundred acres, and still cannot supply the demand. I do not think we can produce too much good fruit. You of Missouri have probably a greater future before you than we have in Iowa. I am from Iowa, but I recognize your superior natural advantages. In Iowa we have this advantage, that we must get our work done in the fall, and, for instance, not leave our corn in field to waste all the winter, as some do in Missouri. When I left home it was eight or ten degrees below zero. That very thing is what gives us our energy.

Our apples are not as large as yours, but are lighter colored. In Iowa the Ben Davis is as red as your Jonathan. I am much interested in the new seedlings I see here. We are trying to develop hardy fruits to stand our climate, and these seedlings show what kinds of fruit we may look for from the seeds of old varieties.

Mr. Bronson, of Iowa—I am from Southeast Iowa. I am glad to be with you, and invite you to attend our Iowa meeting.

Mr. Reed, of Wisconsin—This is the first time I have visited the State of Missouri. I was pleased at the remarks made by my friend from Iowa. A week ago last Saturday it was 20 degrees below zero at my home in Wisconsin. I have heard since that it has been still colder since I left, so I am rather glad to be away. Your exhibit is very pleasant to look upon. We expend our efforts upon that greatest of all food plants, the Irish potato. We stand in potatoes where you stand in apples; but we are breeding hardy apples for the cold north, such as the Northwestern Greening, which promises to become one of the standard fruits. We also originated the Wolf River, which at New Orleans received the prize as the largest and finest new apple.

President Evans—Does not the Wolf River grow larger here than in Wisconsin?

Mr. Reed—I can't say; it probably would. I have known it to weigh one pound and nine ounces in its native county.

W. G. Gano—Mr. President, it has always been our practice to send greeting to our sister state societies. I move that our Secretary send a message of greeting to the Indiana society now in session. Carried unanimously.

MISSOURI HILLS FOR FRUIT-GROWING.

Mr. President and Members of the State Horticultural Society—Your good Secretary had requested the writer to prepare a paper for this meeting on the subject as headed above, "Missouri Hills Suitable for Fruit-growing."

Why he made this selection, although there are better learned, more talented, more able and more experienced members in the Society, who could pay this subject the merited justice involved, I do not know. I have accepted, and will try to tell you why "Missouri hills" are well suited for fruit-growing, if even I cannot give you much new of interest, still to refresh the memory and spur to renewed action in the field of horticulture shall be my aim at this time.

Your hills and hill-sides, and for miles extending plateaus, especially those bordering on your great river and their tributaries, are the

very lands suitable for tree-growth, and for the development of good, sound, well-colored, juicy and perfect fruit. They contain all the elements needed, as, a rich surface soil; porous sub-soil, containing fragments of disintegrated lime-rock, iron and marl; a needful elevation, and by that a natural drainage to promote a healthy tree-growth. Your hills are rich from the foot to top in building materials, fuels and precious metals. Look at the mountains of iron-ore, lead and zinc-ore, and consider the find of gold in the hills of St. Charles county of late. And why are these hilly lands of your State so highly favored for the growth of fruit? They are located in a State blessed with a temperate climate. What would Missouri's hills be without the natural helpers, as, the winter's snow, spring and fall rain and summer showers, and warming rays of the sun, ameliorated by the wind's current? Your hills afford a healthy location for man and beast, and for vegetation. The swift currents running alongside carry off with them the cold blast and prevent Jack Frost from doing damages in early fall and late spring; carry off the poisonous vapors, injurious to animal life and botanical health; the cause for development and growth of injurious fungi to plant life, and to malarial fevers to animal life.

On such hills and hillsides, dales and plateaus are raised such fruit as you see spread out before your eyes on these tables, fruit that made a lasting imprint upon the mind of the thousand of visitors at the Columbian fair in Chicago, coming from all parts of the world.

Such an exhibit of fruit, as was shown at the Exposition in St. Louis in 1895, and looked upon and examined by the ten thousand visitors daily for 40 days, made a wonderful and lasting impression upon the memory of every visitor. And these fruit wonders were the products of your Missouri hills. Cast your eye over these tables and behold that kingly Ben Davis, he originated not more than twenty miles south from here, down on the hills in Howard county; and that rosy-cheeked pale-faced Huntsman favorite, his origin is in another hilly Missouri river county over in Lafayette county.

And now I should think this should satisfy every mind of the capability of your Missouri hills as suitable for fruit-growing.

But I do not want to be understood that all Missouri hills are of the kind as described above, for there is no rule without exception.

There may be hills in your State—which are not fit for fruit tree growth, nor fit for any agricultural or horticultural purposes whatever, but what I did say and what I do know is that the Missouri hills bordering on the running waters of the Missouri and Mississippi rivers and their tributaries are the kind of hills for tree growth and the natural field for the orchardist. They afford a high, dry, healthy location for

the home of the husbandman and his family and for the production of good, sound and perfect fruit, may it be in small fruit or in tree fruit.

Please, my dear friends, only one item now and then I am through. Have you heard that cry: over-production, ruinous prices, fruit-growing don't pay, etc. Yes, there was an over-production of inferior fruit that did not pay for handling. We must raise good, nice, well-colored and perfect fruit, and offer for sale nothing else but that, packed in attractive clean packages, every specimen wrapped in tissue paper, and my word for it you will never hear it said "fruit-growing don't pay, or glutted market." Certainly it don't pay to raise wormy, scabby, misshaped, ill-colored small fruit. We must learn to raise good fruit. The fruit-grower must know his business to be successful; he must be wide-awake; must be diligent; he must fight the insect foes; must know when to spray, how to spray, with what to spray and why to spray; he must protect his young fruit trees from being barked by mice and rabbits, prevent the insect from laying its egg in the bark of the trees and if it escapes his vigilance, must cut it out in time to save his tree.

Never let your tree bear a full crop. Thinning is one of the most important duties of the fruit-grower to raise a good specimen, to raise marketable fruit.

If fruit-growing don't pay, why do capitalists, who are very cautious, far-seeing and careful in making investments, invest their money in orcharding? Do you think your Secretary tells you a myth when he talks of an orchard company setting out 100,000 fruit trees on the hills and plateaus of Barry county? Fruit raising does pay, and more so on the hills and hillsides in the State of Missouri. Therefore I would say, plant every hill and hillside suitable for fruit with the best marketable kinds of fruit and crown the top of these hills with the luscious grapes, and by so doing you will make your State blossom and its inhabitants prosperous, happy and well contented.

L. GEIGER, Boonville, Mo.

FIRST SIX YEARS OF AN ORCHARD.

The life and profits of an apple orchard depend upon the first six years' care. Enough mistakes are often made during this period to make an orchard forever unprofitable.

Experience in many things is the best teacher, but to raise an orchard by actual experience would be too expensive. We must make use of the experience of those who have gone over the road and paid all the bills for us. They now stand ready and willing to keep us from

such mistakes. The best way to get this knowledge is by coming in contact with those of long and valued experience.

There is no place where one can get so much for the money and time expended as at just such meetings as we are now holding. One need not take an active part unless they feel it their duty; but an eager, active listener can gather much and store up enough knowledge from a few good meetings to start an orchard without making the many costly mistakes of amateurs.

I once heard of two young mothers who were discussing the age at which the education of children should begin. One said begin very young, but the other thought much older; so the matter was referred to an aged grand-mother sitting by, who, after studying for a moment, replied: "The time to begin to educate a child is 20 years before it is born." So with an orchard. It is of vast importance that one should have much knowledge of horticulture before your orchard is set.

One important item is to know your soil. All soil will not admit of the same cultivation. Trees cannot be set the same way on sandy soil with good underdrainage, as they are on soil with a tight clay subsoil.

The orchard I have grown was set on rolling land, having fine surface drainage. This land was once covered with heavy timber oak, sugar tree, ash and walnut, and was originally good land, but at time of planting it was badly worn. It has a sandy loam top soil, with a heavy clay subsoil, in which if you dig a hole and fill with water it will stand for days. To prepare this soil for planting plow as deep as possible and at a time when the ground works well. Prepare as you would a garden, though you have to defer your planting for six months to get your ground in proper condition. Plant your trees as near the same depth as possible that they grew in the nursery.

Prune the tops of your trees as little as possible, but remove all croches and limbs that interfere, and give the roots all the pruning that you ever expect them to get, for this is the last time you should ever see them.

Set 25 to 32 feet each way according to strength of land and varieties set.

Wash the roots of each tree just before putting them in the ground in a barrel of water, having one pound potash to every eight gallons of water.

Make your holes just as near the size of your tree roots as possible and no deeper than necessary. After placing tree return the dirt just as it came out. Never hunt up rich soil to throw in the bottom

of the clay hole, for that would be the very worst thing you could do. As soon as trees are set place a wire gauze around them to help keep out the borers and to keep off the rabbits.

If you plant orchard in the spring plant between trees to corn or potatoes, and hoe your trees after every rain or oftener should they need it. Continue this for three or four years.

To go back a little, you must know what varieties do well in your locality, and know where to get the stock.

Never buy from a middle man. Deal directly with reliable nurseries. Have nothing but the very best stock. Don't allow the price to induce you to take a grade below the best.

Immediately on the receipt of trees heel them in well. If roots are dry wet them and cover well up to the branches.

When ready to set place trees in a wagon and keep it along with those setting. Never take a tree out of the damp straw or earth until you are about ready to set it. Always have two men work at the same place. While one is digging the other can be getting his tree and prune it ready to set. Four men can set from the same wagon. Don't get in a hurry, for your trees are heeled in on the north side of the barn. Take plenty of time or you may have to replant.

I use a check-row wire, tying a red rag every 25 feet on it, and stretch it as tight as possible over the draws, and I have the straightest set orchard I have ever seen.

You must examine your trees well for borers before setting, for even one can kill your tree at two years old. Then every fall and spring examine again to be sure no borer gets in trees.

After your orchard has started to grow you will have to prune some, but never cut off a limb that you cannot give a good reason for so doing. It is much better to prune too little than to butcher your trees.

Head your trees as low as you can get well balanced heads. I prefer from 24 to 30-inch trunks.

Allow no stock in your orchard, for it will not do.

Keep much poultry and allow tenants to keep all they wish.

Always have a good spraying outfit suited to the size of your orchard. Keep this in readiness and have always on hand a good supply of sulphate of copper, Paris green and lime, for you know not the day some pest may strike your orchard. The fourth year prepare your ground and work it up to May 1. Get in garden shape and sow to red clover, and harrow it in just as you would wheat. Don't stop cultivating your trees but continue to plow near them and hoe them well. The hoe is the best orchard tool made. Keep the weeds from taking

the clover by cutting them as often as needed. You won't kill the clover by frequent mowing if you don't take anything off the ground. This you must not do. Never allow clover to stand more than two years. After all vegetation is dormant, plow under a good second crop that you may get your land thoroughly impregnated with seed. Again harrow and work your ground in spring until May, and sow again to clover. Continue this until six years old. I prefer to use the rolling plow. Use all the barnyard manure you can get, and all the wood ashes you can get within ten miles of orchard, and spread broadcast. Do not put ashes close around the tree unless you think your tree is affected with the woolly aphid. Then a shovel of ashes placed at the collar will be beneficial. Never set one tree more than you are able to care for just as it should be. Set all you are able to set financially, then care for each one; try to make no vital mistakes, and if you live to reap the reward you will bless the day you decided to embark in the noble work.

D. A. ROBNETT.

DISCUSSION ON ORCHARD.

Q. How would you prune the roots of trees at the time of planting.

Mr. Robnett—Cut off broken roots and the ends of long straggling roots to about the general length of the other roots, so they will go into the hole without doubling or digging a trench for them. I dig holes only large enough to take in the roots of the tree without crowding.

Mr. Dutcher—We do not exclude hogs from the orchard at all times.

Mr. Robnett—They sometimes do great damage. An old sow bit off a pear tree worth two dollars. They also make deep holes in the orchard to hold water. I would prefer to pick up the windfall and wormy apples and carry them out, rather than risk damage by hogs. They do harm by rubbing the trees. In an old orchard you might possibly turn in a few hogs, if there were no trees less than two years old. I once advised a man to turn sheep into his orchard. They barked his trees. Since then I advise no one to put stock of any kind in an orchard.

Mr. Murray—I think we have had two excellent papers. I think Mr. Robnett is right in nearly everything, but I prefer wooden tree wrappers to screen wire to protect trees against rabbits and borers. They are also cheaper costing, for 12-inch by 20-inch size, about \$3.50 per 1,000. They protect from sunscald, and young trees grow from 25 to 50 per cent. better with the wrappers than without.

Many experiments show that trees do grow faster when protected by these wooden wrappers. In the nursery young trees are close together, and partially shade each other. When planted simply in orchards, they lose this protection, their trunks being fully exposed to the direct rays of the sun which hardens the bark and dries up the sap, perhaps, faster than the newly transplanted roots can supply it. The wrappers also protect them partly from borers. I remove the wrappers from the trees, look for borers, wash the trees, and replace the wrappers. A word about clover: I almost agree with Mr. Robnett. After trees are five or six years old they may be ready for clover. Pigs don't do the orchard any good, but the clover will do the pigs good, and the pigs will do his pocket-book good when he sells them. There is danger of fire when you have clover in the orchard. I knew an orchard greatly damaged by fire. A man burned up my brother's orchard. If the ground is rich and the clover heavy, remove the first crop for hay, and leave the second crop to seed the ground.

Mr. Robnett—Fire keeps me scared all the time. We have plowed a strip twelve feet wide around the outside. We also plow other strips across the orchard, both ways dividing it into sections, so that if a fire should get started, we could confine it to one section. My one hundred acre orchard is divided into eight sections in this way. If one of them should get burned, I would still have eighty-seven and one-half acres of orchard left.

Mrs. A. Z. Moore spoke of trees being injured by the wooden wrappers. The trunks were smaller in the wrappers than above them. Some members thought the wrappers must have been tied too tight.

Judge Miller thought that the exclusion of the light from the bodies of the trees might work harm.

Mr. Gilkeson—Does not the sun crack these on wrappers so that the borers can get in through the cracks?

Mr. Murray—In my experience they don't blow off and don't crack.

Mr. Gilkeson—After twenty years' experience, I think I could now raise an orchard for one-half the expense of wire screens or wooden wrappers. Trees are often injured by wire, and the wooden wrappers crack and blow off and let in the borers. I have seen them blow across fifteen acres. I use paper to keep out borers. I buy it ready cut, ten inches wide and long enough to go around the tree. I apply about the first of May, two inches in the ground and eight inches above. This paper is thick and strong, with a water-proof gloss. It will last two years.

Mr. Reed, of Wisconsin—I have tried Phillips' protector, made of laths and wire. It protects from rabbits, but is nearly as dangerous

as the rabbits themselves. The laths rub the bark from the trees. I have thought of using cloth. Is cheese cloth heavy enough?

President Evans—I think not.

Mr. Stanton, of Illinois—We have tested almost everything. The wooden protector has had its day. We have discarded it entirely. I use good, strong sheeting; buy it by the bolt, put it on in the fall and remove it in the spring, and so for three or four years.

Secretary Goodman—I have used 80,000 wooden wrappers in the last few years. I use a wrapper twenty inches long, ten inches wide and one-twelfth of an inch thick. We fasten it with No. 2 wire. This wire is put up in stones, which we have cut in two places. We put it on at planting time in the spring. We seldom lose a tree, and many of them make a growth of from four to six feet the first season. It is remarkable. We punch holes with an awl through one edge of the wrappers in two places, about four inches from each end. The wire is passed through these holes. It cannot slip off. Sometimes we have not found one borer in 5,000 trees. The first year we do not take it off at all. It protects from borers, rabbits and sun scald. The second year we leave it on till August or September, remove it on a wet day, wash the trees with kerosene emulsion, leave it off for two or three months for the bark to harden. It will get too soft if the wrappers are kept on continuously. Hoe around your trees for four feet to keep away the mice. Wooden wrappers will last from three to five years. If they rot off at the bottom push them down. They cost from \$3 to \$3.50 per thousand.

Mr. Glikeson—I could never buy them for such prices. Ours cost nearly \$4 per thousand.

Secretary Goodman—The wrappers, one-tenth inch thick, cost more than those one-twelfth inch. The thinner ones are better. They don't crack as easily. Cloth will draw away from the bottom and leave space at the bottom for the borer to get in.

Mr. Harrison—I would like to know the cost of the wire screen as used by Mr. Robnett?

Mr. Robnett—I paid \$1.75 per 100 square feet; you can get it almost any size. I have no sun scald. It can be prevented by proper cultivation. Wire screen costs about 2 cents per tree and they will last about five years. I tried galvanized wire cloth, but it injured the trees by rubbing. We cut our wire lengthwise into strips twelve inches wide with a pocket-knife. When we applied it we cut these strips into lengths to suit the height of the trunk of the tree. Some of my trees are headed very low. We have taken it off every year, looked for borers and cleaned the trees.

Mr. Wilkerson—I find from the estimates given that it would cost \$450 less to protect 30,000 trees with wooden wrappers than with wire screen. If the former are just as good why should we not save \$450?

Secretary Goodman—I advised Mr. Robnett to use the wire, for it is the best and he was able to pay for it, but I think the wooden wrapper is the best, taking all things into consideration.

Sam Miller—Wrapping with paper will keep out the borers, common newspaper will do.

Mr. Gilkeson—I have fenced my orchard with wire netting, thirty inches high, with two-inch mesh. It keeps out the rabbits. When one gets in through a hole under the fence we soon get him out. It is much cheaper than protecting each tree singly. Paper is the best thing to keep out the borers.

Mr. Barnes of Kansas—Is there a law in Missouri against catching rabbits? Mr. Wellhouse of Kansas, the apple king of the world, protects his orchard by trapping the rabbits. He has 3,800 traps. He gives the rabbits to the boys who attend the traps. They sometimes get as high as 145 rabbits on one morning.

Mr. Wilkerson—I believe there is no law against killing or trapping rabbits, but I would like to know if there is a law against poisoning them?

No one knew of such a law. Mr. Murray had successfully poisoned them with strychnine. They die quickly, near where they get the poison, hence he thought there was little or no danger of the poisoned animals being killed by hunters and used for food. Even should such a thing happen he said there would be no fatal results from it.

J. H. Monsees—We trap them in four by six inch box traps without bait. They go in to seek a hiding place.

J. C. Evans—I would like to ask Mr. Robnett and Mr. Gilkeson how do they know that the wire screens and the paper wrapping keep out the borers?

Mr. Robnett—One row of fifty-two trees across my orchards was left without screens. From this row we took 210 borers. From 104 trees, two rows, one on each side of the unprotected row, we found no borers.

Mr. Gilkeson—Some of the rows have no paper wraps and have borers, those wrapped have almost none.

Mr. Hairston spoke of the many untested and doubtful articles found in the papers. If a man fails to make a success at his business such a one seems inclined to rush into print. He hoped that the people who run the papers would make it a point not to put anything in the papers which they cannot indorse themselves.

NORTHEAST MISSOURI FOR ORCHARDS.

In the cultivation of the apple my experience is limited, and I realize that there is much to be learned in this progressive age before one is up with the advancing profession. My first acquaintance with the apple orchard was my father's some 50 years ago. The sprouts from which this orchard was grown were taken from my grandfather's orchard near Huntsville, Mo. My grandfather's orchard was planted from the seeds of three apples that he brought from Kentucky in 1818, and there are some of these same apples grown now in this county.

Well do I remember these two orchards of my boyhood days and the many happy hours that we children spent in gathering up the red ripe apples. They were not such apples as we now have, but they were then the best of the land. If my father ever took a borer out of a tree or was troubled any way with them I never heard of it. From all that I can now remember it seems that about all that was done in producing this orchard was to set out the sprouts and tie them up in winter to keep the rabbits from barking them, and to trim up the trees so that the plow could get close to them, for corn was grown most all the time in the orchard. I was at the old homestead two years ago and found some of these trees living; they must be over 60 years old.

Ten years ago I became the owner of a farm near this place and resolved to have an orchard. I talked with my fellow-citizens that had had some experience in growing apples, and learned what I could as to the varieties to plant. The piece of ground selected was on the side of the highway, and I planted four rows next to the road of Ben Davis to keep people out of the orchard. My other selections were Astrakin, Belle Flower, York Imperial, Jonathan, Maiden's Blush, Early Harvest, Red June, Willow Twig, Smith's Cider, R. I. Greening, Milam, and many other varieties. The orchard consisted of 432 trees, of which about 200 trees were Ben Davis. This year I sold \$200 worth of apples, and every one of them were Ben Davis. The question would naturally arise as to what did the other trees do? They were apparently as full as the Ben Davis. The Red Jonathan began to fall in August, and I could not do anything with them. They were worth nothing in market. The summer fruit fell off and rotted on the ground. The Willow Twigs blighted and many of the trees died, and the apples withered; and so it was when gathering time came—they were nearly all gone except the faithful Ben Davis.

I am confident of this one thing, that when a man plants a commercial orchard that he wants to select those varieties only that are known to do well in this climate; that will hang on the tree until gathering time, and then will bear shipping, and have keeping qualities. When I plant again seven-eighths of the trees will be Ben Davis.

As to the cultivation of the trees, the orchard was manured, cultivated in corn, rye sown and plowed under, the borers taken out twice each year. The orchard is ten years old and has yielded three crops of apples, and has paid for itself and the ground on which it stands clear of all expenses.

It is as easy to raise an orchard as to raise a crop of corn; your attention has to be given to either if you are successful. The growing of the apple in our State is but in its infancy. We are right in the center of the apple belt, and we are coming to the front in this industry.

G. N. RATLIFF, Moberly, Mo.

NOTES ON APPLE CULTURE.

After suitable climatic conditions, the next most important element of success in raising big red apples is to get good, fertile, well-drained soil, and as Southeast Missouri, especially that portion lying tributary to the Mississippi river from Cape Girardeau to St. Louis has almost perfect climatic conditions, about all we have to do is to secure good upland soil. I prefer upland, because such has better air drainage. It should be fertile enough to grow good corn. I have had better success with virgin soil, clearing off the timber during the winter and planting the trees in the spring, although I favor fall planting where it can be done. I always do my replanting in the fall. After selecting the land the next most important thing is in securing the best varieties to plant.

For a family orchard of 100 trees I would recommend as follows: For early, 10 trees each of Yellow Transparent and Red June; for summer, 10 trees each of Yellow Horse and Maiden's Blush; for fall, 10 trees each of Grimes' Golden and Jonathan; for winter, 10 Ben Davis, and 15 each of Black Twig and Raule's Janet. These varieties will give a succession from earliest to latest; all are good growers, early to medium bearers and good quality, except Ben Davis, which has so many good habits we can overlook its poor qualities somewhat. For a commercial orchard for profit I would recommend Ben Davis only. It is one of the best growers we have, is an early bearer, fruit hangs on well,

and is the very best shipper; can better grow this variety in my section at \$1 per barrel than such varieties as Jonathan and Wine Sap at \$2 per barrel, as they are slow growers, tardy bearers and more subject to insect depredations. My Ben Davis trees, nine years old, netted me double the amount of money this year that I realized from Wine Sap same age. My late planting has been nine rows of Ben Davis, with one row of such varieties as Black Twig, Rome Beauty, Clayton, York Imperial, Missouri Pippin, etc., to better fertilize at blooming. I have always given Missouri grown trees the preference. If purchaser can buy from a reliable home nursery he should do so; if not, from the large reliable nurseries that grow their own trees. Care should be taken to keep the roots damp and in good condition, and before planting always dip the roots in kerosene emulsion, or strong tobacco solution, to kill the woolly aphis, as but few nurseries are exempt from this pest. My land being very broken and rough requires considerable patience in getting the rows straight. I plant 30 feet apart both ways. First stake off every fifth row north and south clear across the tract, with stakes four feet long, tops whitened with white wash so as to be plainly seen.

I use as a measuring rod an eight-inch board, tapered to four inches at the ends, and 15 feet long, with a small spirit level about two feet from each end; also a plumb bob at one end, and this is carried by two men, keeping the board level, who follow the stake line and measure off two spaces, or 30 feet, and put down a small peg. After two lines are thus run, the spaces between are laid off in squares of 30 feet, and a peg put down. For each tree I have found this by far the best way to get trees straight, and in line both ways, on hilly or rough land.

The diggers then follow, digging the holes where the pegs are stuck and should be large enough to accommodate the tree without twisting or cramping the roots. Surface soil is placed in the bottom of the hole, tree placed in position and held by helper while the man with shovel fills in more surface dirt; the helper works the dirt in well among the roots with his hand as hole is being filled, tramping down solid with his foot when hole is about filled; care should be taken not to get tree too deep. I prefer to have tree no deeper than grown in nursery.

As soon as planted, trees should be protected from rabbits and mice, either by using veneer wrappers, corn stalks or some wash. I have had better success with the pine tar wash, painting the bodies up two feet with the tar reduced with linseed oil or water; if reduced with water, soap has to be added, and heated and made as kerosene

emulsion. This and other washes are generally condemned by nursery-men and horticulturists, but after a trial of three years I can recommend it for both apple and pear trees. It will keep off rabbits, mice and even sheep, if washed high enough. If dirt is removed so as to apply an inch under ground it is an effective preventive to borers.

The orchard is now ready for cultivation, which should be thorough. Presuming your land was thoroughly plowed prior to planting, which should always be done if possible. Shallow cultivation should follow at least once a month from planting time until July; would then sow land in cow peas, using one bushel to the acre broadcast, and hog down when ripe, being careful to clear away all vines and rubbish around the trees to prevent harbors for mice; I lost several hundred trees in one winter by this neglect. Further north where peas require longer season to mature, I would recommend planting them earlier, and in drill rows, one-horse corn drill being best adapted for this purpose, and cultivate peas same as corn, cultivation benefiting both trees and peas.

I know of no crop so beneficial to the orchard as cow peas, and they can be grown successfully all over Missouri. The Whippoorwill variety will mature in one hundred days and produce about twenty bushels to the acre, worth more for hog feed than same amount of corn, to say nothing of the fertilizing properties. Peas are without a question the greatest nitrogen trap known; they will gather more nitrogen from the air and store it up in the soil, where needed, than any other plant grown.

This last summer I have grown several acres of Soja beans, another leguminous plant. They are even more productive than the peas, do not vine, and on land not subject to washing from rains, is a very valuable plant. Next year I will plant one row of beans on each side of the apple trees and fill out the middle with peas. I can cultivate the plant longer, as it does not vine, and the peas in the middle, with the long heavy vines, will prevent washing from heavy rains. The Soja beans will also mature in all parts of Missouri, requiring about one hundred days to mature.

After having tried all the different systems of pruning I have adopted the following system: I usually plant two-year-old trees, trim off all side limbs, and cut back head to four feet. The next fall, after one summer's growth, I cut back to five limbs, equally divided around the tree to form the future head, and cut these limbs back to one foot in length. The next summer two sprouts should be permitted to grow from each of these limbs. This will give the tree an open, uniform

head without any central growth. After this but little pruning will be required, only keeping off water sprouts and limbs that cross each other

If land is kept in fair tillage for five years the orchard will begin to bear, and most orchardists with advanced ideas would tell you to begin spraying. My experience is that a drove of hogs in an orchard, from the time the apples begin to fall in the spring until the gathering time, is worth more to the fruit-grower than all the spraying machines ever built; in fact, with me, spraying thoroughly two seasons was a failure and really a detriment.

As soon as mature apples begin to fall picking should begin. If weather is fine I put the apples in piles for a week to color up. The fruit should always be put on the north or shady side of the tree in flat, thin piles, and a week will greatly improve the color. Then pack from the piles, using regular 12-peck barrels, facing with best colored fruit and having the apples uniform in size all through the barrel. Shake barrel well when filling, and fill so as to press head in solid enough to prevent rattling. The trade is very particular as to this matter. I first press in with a false head lined on the under side with cotton or other soft material; then press in the head, nail and line; then brand quality and variety on the faced end of the barrel. The slacked-packed barrels will greatly injure the sale of the best fruit, and common fruit cannot be sold at any price often when slack-packed.

We have had considerable discussion among fruit-growers for the past few years as to the pasturing of apple orchards with sheep. This season I had 200 sheep pastured on my orchard, and I consider them a great advantage, as they keep down weeds, and their droppings are quite valuable as a fertilizer. Of course, small trees have to be staked and bodies of all trees kept washed with the tar, or lime and carbolic acid wash, to keep the sheep from barking bodies of trees.

W. R. WILKINSON, Altenburg, Mo.

[This wash should be used with a great deal of caution, as many have lost trees from the use of it.—L. A. Goodman, Secretary.]

BEN DAVIS ORCHARD IN SOUTHWEST MISSOURI.

We are all enthusiastic in our work of growing the "Big Ben Davis," prices this year being remunerative. Many others besides myself will set large orchards of "Ben's" this coming spring. The first lesson we have learned after getting our trees in bearing is that we must spray or quit the orchard business. The next is we must cultivate thoroughly.

We have also learned that in this section heavy black loam is the place to set Ben Davis apple trees. The drouth does not effect them so badly. We have just passed through one of the most trying seasons on apple trees (as well as all other kinds), perhaps, we will ever experience, and my observation has been that trees on heavy black loam carried their fruit better and they were firmer, larger and brought better prices than orchards on hill land, besides the loss of trees was less.

B. LOGAN, Marionville.

GROWING APPLES FOR PROFIT.

The first and most important factor in growing apples for profit is the grower, for if he fails to do his part, then the whole thing is a failure. He need not know all about the business in order to make a profit, but he must know that it requires his constant care. If the grower thinks that he has done his whole duty when he has bought and set out his orchard he is sure to fail. He must know himself well enough to be very sure that he will give it his attention.

The first thing in order, but not in importance, is the selection of a site for your orchard. This should be as nearly level as possible. Any land that will grow a fairly good crop of corn is rich enough for an apple orchard. It should be plowed as for corn; then lay off your apple rows north and south, two rods apart, by going both ways with a two-horse plow, running in the same furrow, throwing the dirt out both ways; then light furrows east and west, one rod apart. This will make 80 trees to the acre, and in the best shape for cultivation, for gathering the fruit and to protect each other. Get your trees from the nearest reliable nursery. Go and get them yourself. Get yearlings if you can; they will live and grow better than older trees. I would never set older than two-year-olds. Put trees enough in the wagon to go around. Have them well protected with damp straw or saw-dust to keep them from drying out. Drive between two rows and set on each side. Place the trees in the furrow at the cross. Fill in the soil around them and firm it down well. When you have gone around, hitch to the plow and throw the dirt back into the row, and so on till you are done planting. Then go over them and right them up.

A very important item in growing apples for profit is what varieties to plant. A mistake here would perhaps prove more fatal than in any other part of the business. There are two essential qualities that your varieties must have or you will not make any profit. They must be good bearers and good sellers. If they lack either of these they are a failure. The Ben Davis is the most profitable apple I know of.

Now having your trees set of the right varieties for profit, you must give them the very best cultivation possible, for if your trees are stunted the first year they will never do as well afterward. If the ground has been well plowed the cultivation need not be deep, but the surface must be kept clean and fine. Plow or hoe, if possible, after every rain. The land can be planted in corn or potatoes or some other cultivated crop till the trees are old enough to sow to clover, say four or five years, then plow once in two years. You must now be on the lookout for insect pests, especially the round-head borer. The surest way to save your trees from borers is to take the surface dirt away about an inch deep around the root of the trees and examine them carefully and cut out all you can find, then rub on a thin coat of soft-soap and put the dirt back to its place. The best time to do this is in July or August. If it is done every year you need not fear the borer. Most other kinds of insects can be kept in check by spraying with the different preparations now in use.

Apple trees should never be pruned very heavy at any one time; I do most of my pruning in the spring after the sap starts; they seem to heal better then. I cut out all cross branches and thin out every part so as to let in the light to give the fruit the proper color.

Now I want to say a few words about how to grow apples at a loss. If you will buy a piece of land close to a big town or city, pay about \$150 an acre for it, then send way off for some fine large trees of some new-fangled process of grafting or budding, such as whole roots as on oak trees, of some fine variety, such as Yellow Bell flower, at 50 or 75 cents apiece, then set them out 40 feet apart each way in holes four feet square and two or three feet deep, putting the top soil in the bottom of the hole and the clay on top and then wait till they bear.

B. R. BOUCHER, Cairo, Mo.

DISCUSSION.

A. Nelson—Why not plant enough Maiden Blush to load a car and get from \$2 to \$2.50 per barrel for them? The Maiden Blush will make more money than the Ben Davis. Not enough attention is paid to the Maiden Blush, Grimes and other early apples. We do not plant enough of them to load a car.

Mr. Reed of Wisconsin—I would like to emphasize the raising of such apples as the Maiden Blush, Grimes and Jonathan. I think your Ben Davis apples in Missouri will compare with our filled cheese. They will ruin the reputation of your State for fruit. We have a law in Wisconsin preventing the making of filled cheese. You ought to

have a law against growing Ben Davis apples. Maiden Blush will always sell. If you grow Maiden Blush every grower should learn to be a shipper. He don't want to wait for some shipper to come along and take cream and leave the skim milk.

Secretary Goodman—It is understood that this Society does not indorse everything that is published in the reports. Every man's views stand upon their own merits.

C. C. Bell—The Maiden Blush is an excellent apple, but I must take issue with Mr. Nelson on the score of profit. As a dealer, I like to buy it, but I can not pay as much for it as for Ben Davis, nor can we get as many apples from the tree as from the Ben Davis. The Maiden Blush stands in the front rank. It is desired on all the markets, but I can't recommend it for making money.

Mr. Murray—We horticulturists have wide differences of experience. One success or one failure by one individual don't prove anything. Buyers will not come along and pay fancy prices for summer apples. As a rule, in small lots they go to waste. I advise no man to grow summer apples for profit unless he can handle his own fruit. Ben Davis is ridiculed for its poor quality. I call your attention to the fact that Missouri Ben Davis is a very good apple. In countries where apples don't grow they eat it and pronounce it good. Missouri Ben Davis sold in Hamburg, Germany, on the 25th of October for \$5 per barrel; Newtown Pippins sold in Liverpool for \$6.01 per barrel. If you can grow Newtown Pippin for one cent more per barrel than you can Ben Davis, go ahead; I can't.

Music by pupils of High school.

PLANS FOR GATHERING, SORTING, HANDLING AND PACKING PEACHES AND APPLES.

Plans for gathering, sorting, handling and packing peaches and apples are so numerous and so dissimilar that to describe them all would take more time than would be profitable at this meeting, hence I will only endeavor to drop a few thoughts on one plan (the best one that I know of) in each operation, and if by this means I succeed in calling out a good discussion on the subject, I will have attained my object.

On the handling of peaches and apples, the staple of all fruit, from the tree to the consumer, depends the success of the horticulturist.

It matters not how fine fruit may be raised, nor in how great

abundance, if it is not properly handled from the tree to the consumer, it loses money for the producer.

I cannot refrain from diverging from the subject one moment right here to say that the fruit-grower who expects to reduce the handling of his fruit to a minimum cost, which is necessary to success in these days of sharp competition, must consider the cost of gathering and handling when he plants his orchard. Any one who has ever gathered peaches knows that he can gather a solid block of proper size of one variety at one-half the cost that he can a conglomerated mixture of six to ten varieties in the same block.

Again, how exasperating and how expensive it is if we are gathering, say, Elberta peaches and finish up a block in the middle of the forenoon or the middle of the afternoon, and have to pull and move forty or fifty pickers and packers and all appliances for handling the fruit to another block of Elbertas in another part of the field one-half or perhaps a mile and a half distant.

A block of peach trees should not consist of more than ten acres of land or 40 rods square, and should have a driveway on one or more sides, according to the position it occupies to the public highway or railway station. The driveways need not be more than 20 or 25 feet wide. If I were planting 1,000 acres of peach trees of one or many varieties, I would divide them into 10-acre blocks; or if I were planting only ten acres of one or more varieties, I would not plant more than four varieties in an orchard of only ten acres; I would plant them in one block. If I wished to have two varieties I would plant one-half the block to each variety. If four varieties would corner them in the center of the block, because in the center of a 10 acre block is where we want to do our packing.

The laying out of an apple orchard may be different, as the gathering and packing of apples is different from that of peaches. The apple orchard may be planted in rows the entire length of the field or orchard plat, it matters not how long, if each row contains but one variety of apples.

Handling a crop of peaches requires no small amount of forethought and preparation before the peaches are ripe, as any delay means loss when they are ripe. In view of this fact we should have our box material on hand early, and a goodly number of each kind of package that we expect to use during the season made up.

I will not undertake to go into detail of the merits of the different kinds of packages in use, but will say that I prefer three kinds and but three kinds of packages for the general market; the six basket carrier, the "California" No. 20 box and the third bushel box.

Next if the trees are large we should prepare one good self-supporting ladder for every two men that we expect to employ in gathering. These ladders can be made cheaply by any carpenter of any strong, light material; pine or linn answers a good purpose. The material had best be ordered direct from the mill, that it may be cut the proper size, which should be one and one-half by three and one-half inches at lower end, and one and one-half by two inches at top, and ten to twelve feet long. Three pieces for standards or uprights are necessary for each ladder. The steps may be made of one by three-inch batting. Now construct the ladder so that the uprights will be three feet apart at the base and taper to two inches apart at the top, with a step every fifteen inches, let one-half the thickness of it into the upright and nail securely. Now place the small end of the third standard between the top of the standards of the ladder and bore a half-inch hole in all three and place a half-inch bolt in them and put a nut on bolt. The third leg or standard will close up so that it may be carried, or stand out at any angle and be self-supporting, so that the picker may go into the tree or may go up by the side of it.

Next, let us prepare at least four good half-bushel picking baskets for every gatherer that we expect to use. I say good ones, for if they are not good they will last but a short time. Taking them as they come from the factory, they should be gone over and thoroughly re-nailed to prevent them pulling apart when filled. Now, take paint pot and brush and number each basket, four No. ones, four No. twos, four No. threes and so on, four baskets bearing the same number for each picker. Each basket should be padded with excelsior and lined with good burlap, or cotton drilling or denims.

Now the gatherers are ready to go to the orchard, but we have made no provision for the packers. A packing-table is necessary and is easily made by cutting 2x4 scantling 3 feet long for legs and putting on them three 1x12, 16-foot boards, surfaced on one side, making a table 3x16 feet. There should be a 1x4, 16-foot strip nailed lengthwise on edge through the center of the table to elevate the inner end of the box while being packed. Then there should be shade provided for the packers, for we are going to pack the peaches in the orchard where they grow. This is readily made by procuring tent or sail cloth 16x24 feet, with holes well worked into each corner, middle of ends and sides, one stiff ridge-pole reaching the entire length of the sheet; three pike-poles 12 feet long to support the ridge-pole and three pike-poles 8 feet for each eave or side. Enough small rope may be put into the loop-holes of the canvass to secure it in position. Now spread the canvass out and place the ridge-pole exactly in the center lengthwise

and fasten it securely with tacks or staples. Now you may roll the canvass up on the ridge-pole and two men can carry it anywhere they wish.

Next to be considered is a wagon to transfer the packages of peaches from the packing-table to the railway station. There are a number of fruit-wagons manufactured for this purpose, all of which have merit, but as good and as cheap one as I have ever used is to make a body of 2x8 inch planks, 16 feet long, for bottom and 1x6 inches 16 feet long boards for sides, three boards for each side, mounted on a set of twenty-hundred Studebaker springs, set on a common road wagon. If the wagon is well coupled out it gives elasticity to the load, both from the spring of the body and the springs under it. It is of vital importance to get peaches to market without bruising them.

Now we are ready to go to the orchard. If the size of the orchard will warrant the outlay, I like to go with at least 15 pickers and 10 packers. Women make our best packers, as a rule. Set the packing-table and stretch the shade either in the middle of the block to be gathered, or if the block is too large to be gathered at one setting, place them so that the fruit can be brought to the table from 20 rods in every direction. While the table is being set and the shade stretched, let the foreman start his men to gathering by first giving each man a numbered basket and taking his name and number of his basket and require him to use no other number. When the first round of baskets are full, have each man to carry it to the packing table and take an empty one, the number of which corresponds with the one just filled. By the time he has gathered two or three baskets the first that he picked will have been packed, so that he can always have his own number.

How to gather peaches from the tree is easily told. Simply take every peach that is ready to ship carefully from the tree by hand and place it in the basket. When the basket is thus filled, carry it carefully to the packing-table and set it carefully down. But when to pick them, under the varied conditions of weather, markets and distance to ship, is a more difficult point to explain. Yes, I will say that it cannot be explained, but must be demonstrated by object lessons.

I will say farther that if I had as much as a car-load of peaches to put on the market I would pay a good picker and a good packer liberal wages rather than to get my information by experimenting or by all that pickers and packers could tell me.

Like all other avocations, people must be trained to handle fruit correctly, or some one must suffer from lack of correct handling.

The producer is usually the one who suffers.

I will also say that I never knew a man or woman to become an expert in gathering or packing peaches or apples in one day, or in one season.

But to return to the packing table. Here again experience is necessary for the best results. At least one person in charge should know the proper size, shape and quality of fruit that should go into each kind of package. Also the condition of it as regards ripeness for a long or short shipment. All the cull fruit should go into the cull wagon. There are fruit-growers who lose more money by shipping cull fruit marked up as "No. 1" or "Fancy," than by the "middle man."

The table described above will accommodate ten packers.

If the fruit is reasonably good and the packers have had some experience, that number will put up a car-load of from 900 to 1,100 cases per day. As intimated above, I prefer women for packers, young women especially take a pride in making nice fruit look pretty in a nice clean package. However, I have had some men that were adepts in packing peaches. We find it profitable to keep an expert packer constantly in charge at the packing-table with entire jurisdiction of the packers. An elderly lady is usually best for this position. She should be quick, alert, industrious, kind, but uncompromising.

Boys and girls and older women soon learn to respect the authority of such a lady.

Each packer should be encouraged to put a private mark on every package that they put up.

If the system herewith outlined, or a better one is carried out, the peach-grower of this part of the State at least will have not only a pleasant business but a remunerative one, and the time is not far distant when every city and town in the United States that has railroad communication may feast on peaches grown on the Ozarks.

As intimated above, I have merely mentioned some of the different processes to be gone through with for the purpose of bringing out discussion on the handling of peaches, and yet the length of this paper admonishes me to stop here without touching on apples.

If our worthy Secretary will excuse the omission, and it is so requested, I will promise to prepare a paper on the handling of apples for the next meeting of our Horticultural Society.

H. E. MOSELEY, Olden, Mo.

WEDNESDAY, 2 P. M.

The following committees were appointed :

Committee on Fruits—J. W. Stanton, Illinois; A. Bronson, Iowa; W. G. Gano, Missouri.

Committee on Flowers—Judge Miller, Mrs. Nelson, Mrs. Chandler.

Committee on Finance—J. T. Snodgrass, N. F. Murray, D. A. Robnett.

Committee on Obituary—A. Nelson, F. H. Speakman, H. Schnell.

Committee on Final resolutions—J. G. Kinder, R. J. Bagby, A. H. Gilkeson.

Mr. Nelson—Every speaker should give his locality. I am from the summit of the Ozarks. I operate up and down the Frisco road for many miles. High quality early fruits pay. We sell other apples in Memphis by the barrel for 50 or 75 cents more than we get for Ben Davis. I speak as a grower, a buyer and a shipper. The Maiden Blush is among the surest bearers in our country. It has not failed in 15 years.

INDIANAPOLIS, IND., December 18, 1897.

To Secretary Horticultural Society, Moberly, Mo. :

The Indiana Horticultural Society responds to your greeting. Accept thanks and best wishes.

J. TROOP, Secretary.

THE FUTURE OF HORTICULTURE IN MISSOURI.

In considering the future of horticulture in our State, it is but natural to include the future of Missouri State Horticultural Society. So closely has this Society been identified with the development of horticultural interest in the past that we may be assured that it will be so in the future, and as this interest expands and grows, so should the work of this Society expand into newer and broader fields of usefulness to the true interests of those engaged in horticultural pursuits.

The business of fruit-growing is prolific in bright hopes and bitter disappointments. We see a splendid result attained with but ordinary skill and attention when straightway in our minds we conclude by multiplying the acreage, and multiply this by a series of like successful years, we soon arrive at a comfortable bank account and a financial state of comfort and affluence for the balance of a lifetime. But alas, it somehow will not work out in practice.

The susceptibility of fruit to unfavorable climatic changes and conditions; the variability of success, with varieties when grown on different soils; its perishable nature limiting the scope of profitable

marketing; its insect enemies and diseases; the fierce competition of rival districts; the overstocking of markets through lack of reliable and prompt information that would prevent; the excessive cost of rapid transportation; the unreliability of middle men if we wish to use so mild a term in describing the rake-off of the commission man; all these go to make up the elements of uncertainty that is incidental to this business to a greater degree perhaps than is the case with growth of any other important product of the soil.

I will not assume a superior wisdom in saying that there is a scientific and sure way of securing such varieties as we desire. It is well known that varieties of the same species of fruits can be crossed by hybridization just as certainly as the stock-breeder can produce the desired type by judicious crossing of selected types of our domestic animals. That by top-grafting on bearing trees these new varieties can be brought into bearing and their merits ascertained in three or four years.

The principle reason, no scientific persistent and extensive effort is being made to produce superior varieties, is because it offers very slight recompense to the originator, personally; this is a work that properly belongs to the government, or State Experiment Station. Where one seedling is brought into bearing in the old way, there should be one hundred thousand carefully crossed seedlings brought into bearing, and the most promising sent to different sections of the country and tested. Under such a system does anyone doubt that in a decade we could produce a thousand varieties equal to any we now have, or that it would be reasonable to doubt that ten, twenty or fifty of these scientifically produced varieties would be very much superior for our purpose to any we now have?

In this connection there is another matter that should also be tested by the State and government on experimental farms, and that is the influence of varieties on each other when united. I believe it is generally admitted that there is an influence sometimes detrimental, sometimes beneficial, which is exerted by the stock or root upon the graft or variety placed upon it. Careful observation for the past twenty-five years only the more firmly convinces me that in this field of research there are greater beneficial possibilities to the horticulturist than in any other one department.

On the grounds of the Olden Fruit Co., the influence of the Mahaleb root on the Early Richmond and English Morrello cherry has been so strong it killed the trees, while those grafted on the common Morrello stock proved hardy and productive. At Mr. S. W. Gilbert's home in Thayer, in Oregon county, stand two magnificent specimens

of the Mazzard cherry; it would be impossible to find two more vigorous or symmetrical trees than these. Now the Mazzard is a true mountain variety; its native home is in the forests of the Alleghany mountains; it formerly was largely used as a stock, but of late years has been superseded by the Mahaleb, because the latter is more easily obtained and is more successful to bud on than any other of the cherry family; but the Mahaleb has never been a satisfactory stock in many sections of the country. I predict that when orchardists adopt the Mazzard as a stock in the Ozark country, that they will have found the one best suited for them.

There is a strange fatality in that section affecting the apple, though you can find plenty of old healthy trees that have existed since the earliest settlement of the country, and are yet as sound and hardy as oaks. Many attribute this fatality in the apple to the effects of the woolly aphis, but if the truth is ever known I predict it will be found in the woolly hap-bazzard way trees are propogated. But we cannot pursue this subject. If it were desired, 10,000 instances could be cited to prove that this feature has been neglected to the detriment of horticultural interests in this and every other State.

I wish to make some remarks in regard to our insect pests and the way we should proceed to avoid their depredations. To give some idea of the extent that insects now cost the fruit-grower will state without fear of successful contradiction that not to include the apples that fell to the ground before picking time, not to include the fruit culled on this account when packed for shipment, but only that actually to the St. Louis market the present season; that the injury by insects cut the price more per barrel than was originally paid the grower for the fruit. Had they been absolutely sound the dealer could have better paid double than the price he did pay. In our market there were thousands; yes, hundreds of thousands of barrels of apples handled that could not possibly have netted the grower more than 10 cents per bushel after fixed charges were paid. Apples at \$1 per barrel or less on the market is simply doing business for your health.

I do not wish to be construed as attempting to ridicule the man that sprays to rid his orchard of insect pests, because if that is the best he can do, then he ought to spray. But is it the best? I doubt it. It somehow strikes me, that to see a man chase around over his orchard with an overgrown squirt-gun in a futile attempt to destroy a horde of insects, that his or someone's carelessness and neglect had fostered into life is much on par with the man who carefully locks his stable-door after the horse is stolen. Well, what would you do? you ask. I answer that it appears to me that there is only one truly sensible

thing to do in the premises and that is to see that all infected fallen fruit is destroyed before insects shall have time to enter the ground and form a new crop to prey on the fruit another year.

A man now has no moral right to turn loose a swarm of fruit-destroying insects into the orchard of his neighbor, and should have no *legal* right to do it. If he will not destroy his insect-infected fallen fruit, then there should be a means provided whereby a proper officer of the law should see that it is done and the cost assessed against the land and the same collected as any other tax.

Those in the newer settled sections of the State cannot realize how very destructive insects can become, but they stand a splendid show to learn. Those in the older sections have found it out with a vengeance. I have seen wagon-loads of apples brought into the St. Louis market that did not contain one bushel of sound fruit.

Another very serious problem that has to be solved is that of transportation. It has become so in many localities at certain seasons that a shipment of fruit has but little more likelihood of bringing a just return than a ticket in a lottery or raffle. The fixed charges of transportation, commission on sales, expense of crating, picking and packing of fruit have first to be met, then if there is anything left, and quite frequently there isn't, the grower comes in for his share, which, by the way, is never so heavy that it costs him anything to get it transported home from the express office. For instance, the express charges from West Plains to Kansas City are \$1 per hundred, \$20 per ton, an earning capacity of \$100 in hauling a car-load 300 miles, honestly worth not over \$40. The fixed charges per crate approximately are 34 cents express, crate and picking 55 cents; if they sell for \$1 per case (and thousands have sold for less), then the commission is 10 cents, a total of 99 cents, and the grower receives the munificent remuneration of 1 cent for 24 quarts of berries. When they sell for less than charges he receives an invitation to remit balance.

This is another hard job laying before the Missouri State Horticultural Society, which is to secure just and equitable rates of transportation to enable the fruit-growers of our State to compete in territory that legitimately belongs to us. Can we do so now? Go into Minnesota, Iowa, Nebraska and the Dakotas, and you will find that the shippers of Southern Illinois, with the splendid equipment and facilities of the Illinois Central railroad, and the equally splendid distributing facilities of Chicago, and these fruit-growers can place fruit into many portions of these states at a profit, when we cannot reach them only at a loss. Do you know what you will meet when you go to a Missouri road for express freight rates similar to that accorded ship-

pers over the Illinois Central railroad via their fruit train? Well, you will be told that their contracts with the express company forbid them from carrying less than car lots at car rates. You go to the express company and they will tell you that they are compelled by their contract to pay 40, 50 or 60 per cent, as the case may be, of present rate to the railroad company for providing facilities and transportation; therefore, cannot afford to reduce rates.

I ask your patience one moment more. I wish to point to the work of one man and his associates. I allude to that magnificent triumph of human effort and intelligence—the Olden fruit farm. What is that improvement and the immense development of the fruit interest of that section directly resulting from it worth to the Springfield & Memphis railroad? I answer, millions on millions of dollars. That company could well afford to transport free of charge to either end of its line every pound of fruit produced on that farm for the next 25 years and then would not have repaid the favor that has been conferred upon them.

Now, does it cost our honorable President anything to ship his fruit? Oh, no; not so much; take a car of peaches to Boston, the expenses are only about \$500. What will it cost Mr. Old Timer back ten miles in the “breash” to ship a car of steers fattened on sumach berries and hazel brush to the same point in practically the same time? Answer: About one-fourth as much. Yet the cattle will sell for as much or more per car-load, will cost as much or more for care and attention en route. One represents the probable gross product of a whole township of wild land; the other represents the annual product of two or three acres of similar land, only the owner has waved his magic wand and caused the black-jack and hickory to disappear and the Elberta and Ben Davis to grow instead. Yet there is not a point on that line, or off it, where the stock grower cannot reach for about one-fourth the price per hundred, per ton or per car, than is accorded this benefactor of that line and South Missouri.

This is the encouragement fruit men receive at the hands of transportation companies, though engaged in a pursuit that produces more tonnage per acre than is the case with any important product of the soil. Do you want to know why stockmen receive such low rates comparatively? I will tell you. Cattle have legs and can be driven to rival lines or even to market, therefore they are carried to market for about what the service is worth. What we want is to produce some varieties of peaches, apples and strawberries with legs; that would soon solve the transportation question.

I do not wish to draw unfair comparisons, and especially do not wish to reflect upon the Springfield & Memphis railroad, because that road has shown more appreciation of the fruit interest, and has done more to advertise Missouri as a fruit State than any railroad within our borders, and in showing that even with that line there is vast room for improvement, then it goes without saying that those dependent on other lines for transportation are in a pretty bad fix.

With our central location and nearness to what will soon become the center of the densest population on the continent, with our magnificent soil and climate, the future of horticulture in Missouri should be filled with bright promise indeed, but not so if we cannot remove many of these unnecessary impediments and uncertainties that now bar our progress.

J. G. KINDER.

REPORTS OF COUNTY SOCIETIES.

COLE COUNTY.

Officers—J. B. Brooks, President, Jefferson City; T. M. Barker, Vice-President, Centertown; A. J. Davis, Secretary, Jefferson City; E. M. Brown, Treasurer, Jefferson City.

Fruit trees generally stood the drought well, and have gone into winter quarters in good condition. About 90 per cent of the strawberry and black-cap raspberries died out during the months of September and October. Red raspberries and blackberries withstood the drouth well, and were not seriously damaged. The following varieties of apples gave best results with us the past season: Rawls' Janett, Ben Davis, Wine Sap, Gilpin, Missouri Pippin, Jonathan, York Imperial. Huntsman and Grimes' Golden. Our peach crop was a fine one, Elberta, Henrietta and Piquetts, late, heading list for profit. Smock, Old Mixon, free, and Crawfords, late, were well loaded with fine fruit. Crosby bore an abundant crop, but is too small for a profitable commercial peach. Gold Dust, light crop, too small. Champion, large, fine peach, but not over 10 per cent of full crop.

There was a good crop of cherries in our section the past season. Quite a large quantity were shipped from Jefferson City. Early Richmond is the one most generally known in our locality. Plums bore a good crop of the natives. Wild Goose is the only profitable sort. Damsons, common blue, and Shropshire gave good results. Japans and Abundance were the only ones that did not rot badly. Pears were killed in the bloom, causing almost a complete failure of this fine fruit. Grapes are but little grown in our county, but what few vines there are grown yielded an abundant crop the past season. Our fruit men have done fairly well the past season, and there will probably be quite a large increase to the acreage of young orchards in our county next spring.

A. J. DAVIS, Secretary.

BARRY COUNTY.

As Secretary of Barry County Horticultural Society, I offer the following as a report of what has been done in 1897:

We see from the reading of county and society reports many of them begin with introduction and close with introduction. It is hard to tell if they have an organization or not, or whether they grow fruit, corn, hay, cattle or hogs, or real estate agents or town boomers, etc.

I believe we should make these reports, giving facts and figures of what we have had, what we have and what we aim to do in the horticultural work.

Barry county has been organized years. At present we have 28 members. President, H. C. Fitch, of Seligman; Secretary, G. G. James, of Exeter. The county society is composed of six local societies, one each, as follows: Monett, Purdy, Butterfield, Exeter, Washburn and Seligman.

The county society meets once each month, on the last Saturday. We held 11 meetings in 1897. We will have no meeting in December, as the last Saturday is Christmas day. We have a regular program each meeting. Papers are read on different subjects, and published in the county papers. We discuss all these subjects. We have worked hard for organization, co-operation, transportation and distribution. We are proud to say we have been successful; have almost perfected the organization of the Southwest Co-operative Union, embracing the territory of Southwest Missouri and Northwest Arkansas. Next Tuesday, December 7, we hold a meeting at Monett to elect officers and executive committee. All the proceedings of these meetings have been published in the Southwest, at Springfield.

REPORTS AND NO REPORTS FROM THE LOCAL SOCIETIES.

Monett—No report. Old officers: President, R. D. Creel; Secretary, Geo. Ranpp; Shipped in 1897, 44 car-loads strawberries.

Purdy—President, —; Secretary, B. Kirby. Shipped in 1897, 4,800 crates strawberries; 3 cars apples.

Butterfield—President, —; Secretary, Geo. D. Bethune. Shipped in 1897, 461 carates strawberries; 171 barrels apples.

Exeter—President, W. W. Witt; Secretary, M. L. Freeze; 36 members; meets first and second Saturday in each month. Shipped in 1897, 1,900 crates strawberries; 700 crates raspberries; 100 crates

blackberries; 50 boxes peaches; 34 boxes plums; 71 car-loads apples. Have for 1898, 100 acres in strawberries; 60 acres in raspberries; 10 acres in blackberries.

Washburn—President, H. J. Wood; Secretary, J. B. Berryhill.

Shipped in 1897, 975 crates strawberries.

Seligman—President, H. C. Fitch; Secretary, H. M. Foster.

Shipped in 1897, 294 crates strawberries, 1,879 crates raspberries, 80 crates blackberries, 59 crates cherries, 2,083 boxes peaches, 28 cars of apples. Acres for 1898, 13 of strawberries, 152 of raspberries, 7 of blackberries.

Barry county shipped in 1897, 58 car-loads of strawberries, 2,597 crates of raspberries, 180 crates of blackberries, 34 crates of plums, 2,133 boxes of peaches, 99 car-loads of apples.

Barry county has for 1898, from the best information I can get, about 500 acres strawberries (200 crates to acre, 100,000 crates, or 166 car-loads), about 400 acres raspberries (100 crates to acre, 40,000 crates, or 66 car-loads.)

The drough has been severe and will cut short our crop one-third to one half.

34,800 crates of strawberries, netted about 90c	\$31,320
2,579 crates of raspberries, netted about 40c.....	1,030
2,133 boxes of peaches, netted about 35c.....	860
80 cars of apples, 15,000 barrels, \$1.20.....	18,000
19 cars apples, 3,800 barrels, culls, 25c.....	550
Total value to the grower 1897.....	51,700

We estimate for Barry county for 1898:

500 acres strawberries, half crop, 50,000 crates 90c.....	\$45,000
400 acres raspberries, half crop, 75 crates to acre, 30,000, 50c.....	24,000
Total.....	69,000

Prospect for the future is better. We improve and grow under organization the apple, peach, pear, plum, etc. Trees have developed very poor. A great many trees died from the drouth, but with fruits of every kind we never have made a total failure of all.

G. G. JAMES, Secretary.

EXETER, Mo., December, 5, 1897.

Mr. L. A. Goodman, Sec'y Mo. State Horticultural Society:

DEAR SIR—Enclosed is a report from Barry county and the locals; two locals made reports, two partial and two none at all.

You see I have had to do work somewhat at guess. Washburn shipped at least 6 cars of raspberries and 40 cars of apples. Purdy is generally the largest in apples but drouth cut her off. I also send you report of our November meeting; the paper read on birds and

Insects is not in print; will be Thursday and will send it to you if it deserves a place in your report. I have done lots of work and spent money in the last 12 years to keep this work going; we have a few men at each point that work all the time for it, attend all the meetings, etc. I would like for every county to make an estimate of what is done and have it published so as to compare. We do not know if we are doing well or not. I am now 60 years old, raised in the early days of Missouri. I know I am not competent to do this work but do it because others will not.

Respectfully,

G. G. JAMES.

LAWRENCE COUNTY.

Our Society is in good working order, and many others will join.

We had a horticultural exhibit of three days, Oct. 7, 8 and 9, where many plates of fine apples, pears, peaches etc., were shown. Our merchants offered some excellent premiums for the best, and all went off nicely.

B. LOGAN, Secretary.

COOPER COUNTY.

The year 1897, had some peculiar climatic changes, which to a great extent controlled the favorable and unfavorable results in horticultural pursuits. The fair prospects of the apple and late peach crops was greatly damaged by the great droughts which prevailed here as well as elsewhere. The increase in price which was very encouraging, was counteracted by the decrease in size and lack of color in the fruit, which caused many estimates early in the season to fall short of expectation when the crops were packed, yet, taking all in all, the farmers are generally well pleased over the result, and many new commercial orchards will be planted the coming season. The strawberry crop was an exceptional one, very fine, but prices ruled low except for strictly fancy. Varieties doing best with writer was Bubach No. 5, Hoverland, Greenville and Parker Earle, the last named stands pre-eminent above all others for productiveness. Prospects for 1898 very poor, plants damaged and many beds from the effects of drought are dead. Raspberries and blackberries produced a fine crop; prices ruled low. Grapes and plums a good crop, but no sales for the fruit. Abundance and Burbank are the plums for people to plant. Fancy varieties of peaches were in demand at fair prices. Seedling and inferior budded varieties not wanted at any price. The Elberta, queen of all the early varieties, reigns supreme above all others for size, color and productiveness. Champion, a fine peach of its class, Heath cling and Salway the best late varieties. The summing up of all the small fruit crops and perishable stone fruits, seems to be to plant and grow only the best, if a man expects to sell at a profit. A suggestion to my brother nurserymen: why are we growing so many varieties of apples when

only a few are profitable to the fruit-grower? Let us revise the list. The following I consider ample and sufficient for all practical use: Summer—Red June, Early Harvest, L. Transparent, Bernoni, Chenango Strawberry. Fall—Maiden's Blush, Rambo, G. G. Pippin, Demine. Winter—Ben Davis, Jonathan, Gano, Missouri Pippin, York Imperial, Huntsman, Janet, Wisc Sap, Ark. Black, Lansingburg. Lady and Ladies Sweet.

H. W. JENKINS.

CRAWFORD COUNTY.

While we have some very enthusiastic members, most of them take hold of the matter very reluctantly, but when you talk to them about the good that could be accomplished they readily agree to it, but when you have a meeting they fail to come out. I sprung the question last summer and by hard exertions succeeded in effecting an organization, but it seems that every thing depends on me to keep the thing going, and to a certain extent I have relaxed my energies in that direction, to see if some of the rest would not come to the front and keep the ball rolling. I can plainly see that fruit raising is one of the most profitable industries that we South-central Missourians can engage in, our soil and climate being especially adapted to fruit culture; and we have a great many fine apple orchards that have fully demonstrated the value thereof, and the acreage of apple trees being planted is increasing each year, and for all not over 10 per cent of the apple trees that have been planted in Crawford county have yet come into bearing. The farmers of Crawford county realized more actual cash from their apple crop this year than any other crop of the year, and when they take hold of the small fruits, as they should, they will find that they will supply a long felt need of something to bring in money at a time when they most need it and have nothing else to bring it in.

Below are the names of the officers of the Meramec Horticultural Association: E. R. Bowen, President; Peter Lovengood, Vice-President; Joseph Marsh, Secretary; K. D. Nerval, Assistant Secretary, and Charles Lay, Treasurer, Steelville.

E. R. BOWEN, Steelville, Mo.

CONWAY.

The Conway Horticultural Society has been a little negligent about meeting lately, especially since Mr. Getty moved away. We met last week and elected officers as follows: President, N. C. Newport; Vice-President, J. A. Day; Secretary, R. O. Hardy; Treasurer, R. C. Newport.

R. O. HARDY.

HENRY COUNTY.

The Henry County Horticultural Society met in court-house last Saturday, with a fairly good attendance—more so than usual. The minutes of last meeting were read by Secretary Pretzinger. Treasurer Burris made report of money in his hands—over \$28. Pretty good showing. Some unfinished business was taken up and disposed of. President Bonham, delegate to State meeting, gave a great deal of valuable information concerning fruit-growing, and also on agriculture. Mr. Stevenson, a young fruit-grower of Deepwater, gave some valuable points on grape culture and apple growing. He is an up-to-date horticulturist. Rev. Armstrong was present, but was called away. However, he said he was in favor of everything that was for the good of the meeting and the Henry county horticultural advancement.

The annual State report was distributed. A few kept—to be given away at our next meeting. J. M. Pretzinger was appointed delegate to State meeting, at Moberly, December 7, 8 and 9. From now on a general discussion of how to have a good meeting and attendance and how Henry county's vast resources in fruit-growing could be advanced. Any one can join this society free for the present, and receive a report as long as we have them.

Adjourned to meet in court-room, Saturday, December 18th, at 1 p. m., prompt.

J. M. PRETZINGER, Sec'y. M. L. BONHAM, Pres., Clinton, Mo.

GREENE COUNTY.

The Greene County Horticultural Society has had a prosperous year. New members have been added and the enthusiasm for fruit-growing was never so strong. During the summer months our Society meets at the residences of members in the country and in winter we meet with city members or in a hall. A bountiful dinner is always furnished. We look forward to the time when the Greene County Horticultural Society will have a hall of its own and a library and periodicals. We have \$110 in our treasury.

G. A. ATWOOD, Secretary.

NORTH HADLEY, MASS., December 1, 1897.

Mr. L. A. Goodman, Secretary, Westport, Mo. :

DEAR SIR—This letter may be somewhat of a surprise to you, and you may have forgotten there ever was such a person, but such was and is the case. I have often thought of the many friends I made among the fruit men of Missouri and of the many pleasant times I had with them and how I would like to drop in on them at their annual meetings. Hope things are going on well at Columbia, and that Prof. Whitten is the right man in the right place, and if so, that he will stay and do some good work for the fruit-growers of Missouri. I was very much interested in his bulletin on spraying peach trees with white-wash, and shall try it this winter.

I see that Missouri is in luck this year as far as apples are concerned, having had a good crop, while we at the coast have had a very small crop. I was in Faneuil Hall Market, Boston, a week ago Saturday, and most of the western fruit had been disposed of; it was not keeping at all well, owing to warm fall. Apples that are keeping well are good property in Boston markets. The firm I send all my apples to (and have sent to the same firm from the time I began growing apples) are holding my No. 1 Baldwins at \$5 per bbl.; No. 2 at \$2.50. Last year I had my No. 1 apples put in cold storage, and they sold from \$2 to \$2.25 per bbl., and the year before they sold from \$3.50 to \$5 per bbl. I had a good crop of peaches this last year, but the prices were very low for these parts. I figured up last night what my peaches netted me per half bushel basket, good and bad, and it was just a little over 81½ cents per basket. In 1883 I had about 1,800 baskets and they netted me, good and poor, (No. 1 and No. 2), over \$1.87 for half bushel basket. In 1895 I had a good crop and that season the run was about \$1.10 per half bushel basket.

The season of 1896 was the worst season I ever saw for the fruit business. All kinds of fruits except peaches were simply loaded. We had too much of a good thing, and I for one hope it will be a long time before we have to handle fruit for so little money.

How has Missouri found the Crosby peach? I set out 100 before I went to Missouri, and have had seven crops from them, and don't want any more. I was on the point of writing you when the Crosby was being boomed in Missouri that it would not prove a profitable peach for market—too small, poor color and shipper—but concluded I had troubled those who had the trees to sell as much as one man ought, so thought I would let them alone. Hale, J. H., & Hinds, the two who pushed it here and my humble self had some interesting reading in the papers over the Crosby, and think I stopped thousands of them being set about here.

What has been the outcome of the large apple orchards that were planted about the time I was in Missouri? Have many of them proved a profitable investment? I had my doubts about it at the time, for most were planting more than they could take care of, and do it as it should be; 100 trees may prove a very profitable investment when 1,000 might result in loss.

How has D. A. Robnett of Columbia succeeded with his apple orchard? I would like to have you give me what has been the increase in the acreage of large and small fruits during the past 15 years in Missouri, and what proportion has been a paying investment. I want to get together the facts from the different fruit sections and write a paper on the subject. I want to put a stop to the planting of trees by persons who will not care for them or the fruit after the trees that live through the neglect they receive begin to bear and flood the market with worthless trash that never pays the cost of handling and prevents good fruit selling for what it would if it was not for the poor stock thrown on the markets. The time is past when the average farmer can or will make money growing fruits; at least it is so in this part of the country.

Winter has just set in; the ground is frozen about two inches deep, and we have about an inch of snow. The prospects for fruit for another season are good with me to date. Hope peaches will go through all right; my trees are in good condition and will give a fine crop if not injured during the winter.

Remember me to any of my old friends.

Very truly yours,

JOHN W. CLARK.

REPORT OF SECRETARY.

When I began to prepare the program for this meeting and realized that I was to write down 40th annual meeting, it occurred to me that I had been in Missouri for some time, and found that it had been long enough to call me an old settler, 30 years old. Ten years after the organization of the Society I came to Missouri and settled in Westport. For 40 years has the Society been working and working, waiting and waiting, testing and trying, hoping and trusting, fearing and dreading, but still working and working all along these 40 years. Only two or three men are living who helped to organize and put in motion the work we are now doing, and yet the work they then started is still growing and developing and increasing until they would no more know the fruit interests of the State nor their magnitude. Since the Society put on new life in 1882, for 15 years the development has been a very gradual and uniform one, and one that has made the State known all over the country as the "Fruit State of the West." From a few thousand of barrels of apples the production has grown and grown until now we see that Missouri stands first this year in the quantity, quality and value of her apple crop. It has simply been a wonder to all eastern, western, northern, southern and foreign buyers the number of barrels and the quality and value of this year's apple crop. Two and one-half millions of barrels from North Missouri, three and one-half millions of barrels from Central Missouri, three millions of barrels from South Missouri gives a fair illustration of the wonderful value of the fruit interests of Missouri in only one particular. No state in all this Union can dispute the position of Missouri as the head of the list this year in apple growing. And this is only one of our fruits, and its value to our State. Next comes the peach crop. Never before has this State been so peculiarly placed in regard to her control of the peach market. The peaches of the State were the wonder and astonishment of ourselves. Every crack and cranny of the State where peaches were growing the trees were loaded, loaded down, and the quality not surpassed anywhere. Peaches went to Boston, Philadelphia, Baltimore, New York, Buffalo, Cincinnati, Cleveland, Detroit, Chicago, St. Louis, St. Paul, Omaha, Denver, Pueblo, Galveston, New Orleans, Memphis, Mobile, Birmingham, Louisville and hundreds of other places, and that is not all, they were pronounced the finest peaches in color, quality and size that many had ever seen. South Missouri produced two millions bushels, Central Missouri one million

bushels and North Missouri one-half million bushels of peaches. In peaches Missouri stands second this year, California alone leading.

These are only *two* of our fruits. Pears, cherries, plums, strawberries, raspberries, blackberries, grapes. Who shall number the bushels, or crates, or boxes of all these fruits that have been put on the market, to say nothing of the quantity used at home? Sarcocoe stands far in the lead in strawberry production, nearly 300 car-loads of berries being sent out last summer. The apple crop was worth \$12,000,000, the peach crop \$3,500,000, pears, cherries, plums and grapes \$1,500,000, and the berries \$2,500,000 more, making the value of our fruit crop worth \$20,000,000.

If any gold mines or silver mines, or lead or zinc mines, or coal mines should have such a yearly return, the world would go crazy over the speculation. And yet right here, quietly and surely, the returns come to us and nothing more is said. I could give you hundreds of instances where the fruit crop paid more than the farm was worth—sometimes \$60, \$80, \$100, \$150 or even \$200 per acre.

You should not be ignorant of the troubles, and discouragements, and trials, and work, and worry that it takes to succeed, for they have often been brought before you in a very plain and forcible manner; but I would have you know that pluck, perseverance, energy, push, intelligence and business management will bring success, if we faint not. You need not fear of having a business that will develop the body and not the head. There is enough to learn in any of the departments of horticulture to keep you busy all your life. The study of botany, of entomology, of chemistry, of geology, ornithology, floriculture, landscape gardening, nursery, forestry, pomology, pathology, will give you all you can do in one life.

OUR SOCIETY AND ITS REPORTS.

Last week I attended the meeting of the Arkansas Horticultural Society in Bentonville, Ark. Your Secretary was greeted most cordially and hospitably, because they knew our Society, if they did not know me. I found there the work we had been doing, and the reports we had been printing year after year for 15 years had made the reputation of this society, and Missouri Society was a household word among them and a model they wished to pattern after. Again I visited the Kansas society and there the knowledge of our Society had preceded me, and they were striving to follow in its footsteps. Last September I attended the meeting of American Pomological Society at Columbus, O., and was happy indeed to find that there the delegates from 23 states and Canada all knew all about the Missouri State So-

ciety and its grand work in developing the fruit interests of this State, and what is better, seemed to know of the wonderful possibilities of Missouri for fruits.

Our report has been well received and is called for continually from every part of the land. As some have said, "the reports of the Missouri Society for the last ten years is the best horticultural library that we can get."

I am happy, dear friends, that I have had a hand with you in thus bringing forward our interests and letting them be known to the world through our reports. Letters come by the score, not only for these reports, but for answers to questions covering all phases of fruit growing, insects, birds and fungi. Our experiment stations have been calling for files of them, and many of the city libraries have asked the same. I have been able to supply thus far these requests for the reports for 15 years.

I have found it necessary to have some assistance in this work and have used the best that I could secure and the work has often kept both of us busy for many a day.

The transportation question is the great question to solve if this business is to develop to the extent it now promises. The putting of this fruit where it is called for is the solution of this question of "glutting the market." "Proper distribution," and we will furnish the fruit for the nations. Much is being learned by the railroads and refrigerator companies each year in the best plan of handling, and carrying, and holding and delivering ice. Brine and ventilated cars are having a fair test and from all these we are sure to have this troublesome question solved.

THE OMAHA EXPOSITION.

We have made a start in this line of work and our Vice-President has visited the Exposition for the purpose of organizing for that display. It seems that our State has made no provision for the showing of our products, and it is very doubtful if this Society can do more than to make a fruit show for a week or so in the fall, sometime in October.

A few members of this Society have taken the burden of all the exhibits we have ever made, and spent their time without stint for the benefit of the State and its fruit interests, and anything more than a week's exhibit would be too much to ask without money and without price.

The Society work it that of helper and leader and director of the fruit interests and other kindred interests and the development of the wonderful advantage that nature has given to our State. We can easily count by the thousands the successful orchards all over the State

which owe their planting and success to the Society, and other thousands which indirectly are located in the State because of it. The Society is not only the open book for others to read in these matters, but it also an immigration bureau, and thousands write, saying: "I am going to move and want to know about the fruit interest before I go." I believe we can safely say that the Society has helped to locate more people than any other one thing.

We can point with pride also to the displays this Society has made, at the many different cities of the Union. The World's Fair and last year at St. Louis, where next to St. Louis, the most perfect exhibit was kept up for weeks and weeks.

Only the other day I met the president of the college at Marshall and he never forgets to give us due praise and thanks for the planting we made there on the 40 acres of campus. Today it stands as a monument to this Society, and in every catalogue the fact is mentioned. The planting at Warrensburg, and Drury, and Kirksville, and Kidder and Clinton are parts of our work.

The great orchards that we find scattered over the State of 400, 500, 1,000, 1,500 acres are a result of the Society, its work and its members.

The local societies are one of the best outgrowths of the Society, and it is the best advertisement of a county to have a band of fellow-workers there scattering knowledge.

The reorganization of the agricultural college and the establishment of the course in horticulture is an outgrowth of our discussions and efforts.

But why outline more of these ways, more than to call your attention to some of the work this Society is doing for the betterment of the State?

The work of the Experiment Station is now taking upon itself just that kind of work that they should have taken years ago, and we find our Board of Curators giving it the support both financial and moral that we have been fighting for, lo, these many years.

Our library we have added unto until we have quite a collection of books which are at the service of the members whenever they wish them. Very many have made use of the books when needing some especial help on some particular topic. I have mailed the book or books to them and after reading they have returned them in the same manner. Let me call your attention to this very valuable plan for using the library. We can make it a circulating library in fact.

The farmers' institutes are a very, very important factor in our education and development, and our Society has its share in all this.

The Vice-President has been with every one, and has well upheld our honor and our position.

The Book on Horticulture is a work that the Society has taken up, and in a few years it will have grown until it becomes a fact in earnest. Horticultural education is a matter that we intend to have established one of these days all over the State, and then have it continued at Columbia to the improvement of our whole State, a matter of so much importance that we intend to be leaders in many others in our State.

The matter of transportation and marketing and co-operation are some of the most important subjects we can investigate. Just how best to accomplish this is a very serious question, and it is to take years, I fear, to solve it rightly. The principle is the correct one, and it only wants perfect management to make it right. It does seem to me that some large strong company will have to step in and help us; one which has cars of its own; one which has agents of its own in all our large cities; one which is responsible and safe and honest; one which can put all its agents under bond; one which will return the money the fruit brings.

Another plan is to have a man of our own in all these large cities to see that honest returns are made. Why should a man shipping a car-load of stock follow it up to market and have no ticket to buy, when a car of fruit worth more than double should be allowed to go where it will and handled and sold and no one to watch it?

And now dear friends, I have only attempted to outline some of the work to do and some we have done. As years go on, I find the work growing and improving, and developing in a remarkable degree. It is a work in which I delight. Nothing does me so much good as to make orchards of the black-jack or scrubby oak lands, or even the prairie lands of our great State. Thousands of these hills are the places where the apple delighteth to grow and flourish like a green bag tree. It is yours to be up and doing, and the results will not disappoint you. Study and work, and learn and work, and discuss and work. Anything you can learn from the experience of others and make that experience yours, do not fear to use it with good common sense and discretion.

Education is only the study of what others have found out from experience and experiment. Study them, educate yourself in what you want to do and success is yours.

The President of the Arkansas State Society asked me the other day, "what was the secret of the success of Missouri State Society?" and I answered quickly, "union." The coat of arms of our State on the

back of the little badge we wear has these words: "United we stand Divided we fall," and this motto is ours, and from it comes our success.

When fifteen years ago I was first elected your Secretary, when not one dollar was at our disposal, and our Society at a very low ebb. I then exacted a promise from the "twelve" who were present, that if the Society would stand by me and work together, I would accept, and not otherwise. How well the Society has carried out their promise, this meeting and the work for the fifteen years has plainly shown. To you belongs this credit as well as to the officers, and to the Society will come glory as long as we obey the motto of our State.

L. A. GOODMAN.

DISCUSSION.

Mr. Murray—We always expect something from Mr. Goodman. A great part of our success as a Society is due to his good work as Secretary.

Mr. Dubois, Cobden, Illinois—I want to compliment the Missouri State Society. I have never attended your Society before, but I find it far ahead of the Illinois Society.

Mr. Barnes, of Kansas—There is no one upon whom we lean for good suggestions more than your Secretary. I only wish that my report as Secretary of the Kansas Society, which I will offer in a few days, might be one-half as good as that we have just heard.

REPORT OF A. NELSON, TREASURER, DECEMBER, 1897.

		EXPENSES.		
1897.				
June	11.	Premiums at Springfield.....	\$12 75	
	11.	Expenses of J. C. Evans.....	20 00	
	11.	" N. F. Murray.....	29 50	
	11.	" S. Miller.....	5 00	
	11.	" L. A. Goodman.....	15 00	
		Warrant No. 366.....		\$112 25
	11.	Expenses of A. Nelson.....	8 70	
	11.	" J. M. Stedman.....	6 18	
	11.	" stenographer.....	10 00	
	11.	" visitors, hotel bills.....	18 35	
	11.	Pencils, pads, etc.....	1 50	
		Warrant No. 367.....		44 73
	30.	Express, \$2.40, \$1.65, \$1 90, \$2.22.....	8 17	
	30.	Typewriter, 3 months, \$20.....	60 00	
		Warrant No. 368.....		68 17
	30.	200 copies Leader.....	2 00	
	30.	120 copies Republican.....	1 20	
	30.	Trip to St. Louis, L. A. Goodman.....	7 50	
	30.	Hotel, 3 days.....	4 50	
	30.	Salary of Secretary, June.....	66 66	
		Warrant No. 369.....		\$1 86
July	31.	P. O. bill.....	10 35	
	31.	Salary of Secretary, July.....	66 66	
	31.	Expenses of G. B. Lamm.....	12 00	
		Warrant No. 370.....		89 01
Aug.	13.	P. O. bill, \$9.75, freight, \$23.46.....	33 21	
	13.	500 copies Southwest.....	10 60	
	13.	Express on reports.....	83 61	
	13.	Express, \$1.49, 25c.....	1 65	
		Warrant No. 371.....		129 07
	24.	Express, \$4.34, \$4.30, \$2 85, \$6 80.....	18 29	
	24.	Blank book, \$1.75, salary of Secretary, August, \$66.66.....	68 41	
		Warrant No. 372.....		86 70
	24.	Expenses of N. F. Murray, Omaha, \$6, \$3.....	9 00	
	24.	P. O. bill, \$4, \$20.....	64 00	
		Warrant No. 373.....		73 00
Sept.	6.	Express, \$1.70, freight, \$2, P. O. bill, \$2.31.....	6 01	
	6.	Printing, \$3.55, \$11.....	14 55	
	6.	Expense of L. A. Goodman to Am. Pom. Soc. Sept. 1 to 3, R. R. fare, \$29.50, hotel, \$6.....	35 50	
	6.	Sleepers and meals on trip.....	7 00	
		Warrant No. 374.....		63 06
	28.	Typewriter 3 months.....	60 00	
	28.	Salary of Secretary, September.....	66 66	
		Warrant No. 375.....		126 66
Nov.	2.	Printing P. O. cards, \$1, P. O. bill, \$10.....	11 00	
	2.	P. O. bill, \$10, salary of Secretary for Oct., \$66.66.....	75 66	
		Warrant No. 376.....		87 66
	18.	P. O. bill, \$20, program, \$18.50.....	38 50	
	18.	Express, \$11 35, salary of Secretary for Nov., \$66 66.....	78 01	
	18.	L. A. Goodman, trip to Sileam Springs, R. R. fare, \$6.85, hotel, \$2.....	8 85	
		Warrant No. 377.....		125 36
Dec.	2.	Whitehead & Hoag, badges.....	28 00	
		Warrant No. 378.....		28 00

REPORT OF A. NELSON, TREASURER—Continued.

Dec.	9.	Expenses of Prof. J. M. Stedman, acc't San Jose scale, Nov. 1 to Dec. 1, 1897	\$201 35	
		Warrant No. 379		\$201 35
10.		Freight, \$5, expenses, \$1.80, \$5 plates, \$2 70	10 35	
10.		Trip to Bentonville, Ark., of L. A. Goodman, \$7.35, hotel, \$8. ..	10 35	
10.		Ink, muclage, bands, \$1.50, P. O. bill, \$5.	6 50	
10.		Salary of Secretary for Dec. \$66.66, typewriter, 3 months, \$60. ..	126 66	
				153 86
10.		Premiums at winter meeting	136 50	
10.		Expenses of J. C. Evans, \$14 15, N. F. Murray, \$16 25	30 40	
10.		Sam Miller, \$9.40, L. A. Goodman and typewriter, \$31.20	40 60	
10.		A. Nelson	39 90	
				247 40
10.		Expenses of G. B. Lamm, \$8, W. G. Gano, \$5.	13 00	
10.		R. E. Baily, stenographer	27 65	
10.		Miss M. E. Murtfeldt, entomologist	25 25	
10.		Express, \$20.28, incidentals, \$2 70	22 98	
10.		Treasurer expense and P. O. bill	3 90	
				92 78
		Expenses of Institute, Salem, Mo.—		
23.		A. Nelson, J. C. Evans, G. A. Atwood.	22 00	
23.		N. F. Murray to Iowa State Society, Des Moines	12 72	
				34 72
				<u>1,845 64</u>
RECEIPTS.				
1897				
June	5.	Balance on hand	\$89 39	
	30.	Cash from State Treasurer	638 28	
Sept.	28.	" "	567 50	
June	5.	Membership, L. A. Goodman	31 00	
	5.	" " A. Nelson	4 00	
Dec.	10.	" " L. A. Goodman	19 00	
	10.	" " A. Nelson	34 00	
		Total	2,183 17	
		Balance in hands of Treasurer Jan. 1, 1898		337 53
				<u>2,183 17</u>

FRUITS, JELLIES AND PRESERVES.

Fruit is one of our greatest blessings, the extent of which we can never appreciate until deprived of it, like the water that is not missed until the well goes dry, or the sweet music 'til the bird has flown.

In a country like this, if we do not have fruit the year round, it is a lack of thrift; everything that will grow in this latitude will grow luxuriantly if properly cultivated. We have a few around Moberly who are trying to follow in the foot-steps of the horticulturist. They have tested our soil by planting apple, blackberry, raspberry and strawberry, all on the same ground; in between the apple trees are planted the berries; they harvest from each a good crop; it is wonderful so much fruit can be grown on such a small spot of earth; it shows what horticulture can do.

It is just as necessary for the man who attempts to grow fruit to be educated in horticulture, if success follows his work, as it is for a physician to understand the anatomy of the human body and the remedies for its relief. When we take into consideration what might be done in fruit-growing and the little that is done, we can see the great need of this great body of men here today from every part of our State.

Fruit is both a luxury and healthful. The father who takes home one apple and divides it among three or four children, giving to each just enough for him to see how hungry they are for apple, I'd think would blush with shame that he had been so improvident in a land where plenty could be had. Children should have fruit as regular as bread. It makes them happier, healthier and better, whatever contributes to the health, brightens the mind and sweetens the disposition.

It was fruit that helped to make Eden a paradise. We all know how tempting rich red apples are; their fragrance and beauty draws to them; there are times when we can hardly keep our hands off. I don't believe God would have blamed Adam very much for partaking of the forbidden fruit if he hadn't have said "It was the woman thou gavest me;" when he said that I believe God thought the best thing to do with him was to put him to work.

If man will grow the fruit I believe the women will take care of it. We are only too glad to have an abundance; the perishable goes into our pantries in the form of preserves, jellies and canned fruits, which is ever ready, and no household is complete without it. I will not enter into anything so tedious as to tell how preserves and jellies

are made, for every housekeeper has her book of recipes, which is far better than anything I can give; my attempts in this direction have been guided mostly by the eyes and palate, but I will add that I get better results from rapid cooking with both jellies and preserves; fruit that doesn't cook easily should be steamed tender before giving to the syrup, and that which cooks too readily should be lifted out two or three times while cooking; this keeps it from breaking. Jelly is better not cooked too stiff, and it keeps better, for when too hard it draws from the glass and lets in the air, which causes it to ferment. If the tissue papers we put over our jellies are covered with sugar it will prevent mold.

Man's work and food has much to do with man. Anyone might envy the horticulturist, with his frank and genial face, no conscience weighing him down; his is a clean work, humanitarian, elevating, living so close to nature, he is in touch with nature's God. May his work go on and on, until every man, woman and child in our State and all the states and the whole world have all the health-giving fruit they need, and may no piece of bread be refused jelly or preserves.

MRS. WM. QUAYLE.

DISCUSSION

Mr. Stanton of Illinois—We failed in Illinois to get a law passed to exterminate the San Jose scale. We did get an appropriation of \$3,000 to investigate and experiment upon the scale. The State now has a professor spraying with whale-oil soap. When discovered, two years ago, the State Horticultural Society undertook to fight it, supposing that it was found in only one place. We have not discovered it in any nursery in the State, but have found it in twenty-nine different places. One place in the extreme southern part of the State is beyond control. It is about 25 miles square and is found in the forests.

After visiting your meeting last year I returned home to find there an assistant of the State Entomologist, who located the scale in my pear orchard of 2,500 trees. I did not know before this that I had it, though I had lost a good many trees by the blight, as I thought. I undertook to fight the scale myself with soft soap and copperas, but was only partially successful. I used this mixture upon 1,700 trees. Upon many of them, I think, there is no scale left. I think soft soap will do if you can get it on all parts of the trees where scale is found. I feel encouraged.

It is strange that there should be no scale in the nurseries of Illinois or this State when it is found in so many orchards. I am satis-

fied that there is hardly any locality where there is any considerable orchard interest where they have no scale. It is very important to start early if we expect to keep it in check.

President Evans—How far will the three thousand dollars go towards fighting the scale?

Mr. Stanton—I think if we had \$6,000 we could eradicate the scale from the State. I think if you had as much as \$5,000 you could make great headway fighting it in Missouri.

Prof. Steadman—In two instances it is found in forest trees and and hedge-fences. I think there is more scale in Missouri than in Illinois.

Mr. Stanton—What I have said concerning this insect is for the good of this Society. You should unite and give a strong pull altogether. It does not seem necessary that any one should be sent to the Legislature to secure legislation of this kind, but we find that it is impossible to get any bill passed without some one to look after it.

The following were elected officers for the ensuing year:

N. F. Marray, President, Oregon, Mo.

D. A. Robnett, First Vice-President, Columbia.

Sam'l Miller, Second Vice-President, Bluffton.

L. A. Goodman, Secretary, Westport.

A. Nelson, Treasurer, Lebanon.

RECOLLECTION OF HOW THE STRAWBERRY INDUSTRY WAS STARTED AT SARCONIE.

On a pleasant spring morning in February, 1883, my friend Jas. B. Wild and I were talking about growing strawberries when Jim says: "John, why don't you grow strawberries for market?" I said, "why, great guns, Jim, I don't know how to grow strawberries." Jim said all I had to do was to come up to his nursery and buy about 2,998 Crystal City and 1,002 Crescent plants with Wilson for late, (but by the way, Jim didn't know as much about varieties then as he does now) so I bought my plants as direct, but Jim had forgotten to tell me how to plant them, or perhaps did not know how himself. He had accomplished his part of the deal, viz: selling the plants, so I had to go ahead and do the best I could myself. I plowed a strip of land between two apple tree rows, harrowed and dragged the same, then stretched a rope line the full length of the land; then all was ready for the plants, so now came the scientific part of the work. I first

went out on the public road and got a bushel or so of fine road dust, putting the same into a wash tub then pouring enough water into the tub to make a thin grouting. Then getting my fine Crystal City plants I dipped the roots of each bunch in the grouting, then placing them in a basket I was ready to plant. So I commenced to dig holes along my rope line with a hoe, when along came my friend Franz Gustafson and said "if you will come over to my house I will lend you my hedge dibble; it will be just the thing to set these with." I said, "what is a dibble? I don't know how to use a dibble." But I went over home with him, and as soon as I seen the dibble I said, "glory! that's just the thing I want." So with basket of plants in one hand and dibble in the other I went merrily to work, planting nearly all the ground in Crystal City before I happened to think that, perhaps, Crescent was almost as good a variety as Crystal City, but as Jim had advised 2,998 Crystal Citys, I thought they were surely the best. So I healed in most of the Crescent plants in case I needed them for replanting the Crystal City bed (but by the way all of the Crystal Citys grew); and now came the hoeing and cultivating. I hoed the bed 13 times and plowed nine times, and how the Crystal City grew and took up all the land was a caution, and to say that I was proud of my future prospect would be putting it vary mild. So now as the fall of the year was at hand, I asked Jim what to do next, and he said "mulch them, mulch them good with straw." I said, "how much?" And Jim said that he had noticed in J. M. Rice's Sarcocoe Vindicator that Hicks had predicted a very hard winter and thought about 12 or 17 inches deep would be about right. But as straw was a little scarce that year, I only got my straw on about four or six inches deep. So all went along lovely till spring of 1884; then came the problem of what to do with so much straw. But, as usual, I went to Jim for advice, and he said "burn it;" but after a little due reflection he said that, perhaps, it would be a better plan to rake the straw off the row into the path. But I said, "Jim, the Crystal City does not leave a path." Nevertheless, I went to work raking the straw off, and then I discovered that I had mulched too deep; the foliage had all bleached white. But Jim said they would come out all right; bleaching would not hurt Crystal City like it did common kinds. So as spring advanced, out came the patch in full bloom, and oh! what a sight; wasn't I proud, though? But pride goeth before a fall, and lo! when harvest time came nearly all the berries I had came from one row of Crescent that I had planted at one side of the bed, on the poorest land I had. The Crystal City was a complete failure, except as to fertilize my one row of Crescent. But Crystal City and like kinds

have long ago been delegated to the rear. Thus began the strawberry industry at Sarcoxie until now Sarcoxie is the largest single shipping point in the world.

JOHN CARNAHAN.

DRAWBACKS OF CO-OPERATION.

A good, careful grower of fruit, in disposing of it through the common channels of trade, ought to be entitled to a fair remuneration. He should not be compelled to content himself with the same price for his fruit with the slovenly, shiftless grower, who has no ambition to raise first-class fruit, but who is awfully interested to share in undeserved profits with his painstaking neighbor. Progressive fruit-growers will find it to their interest to offer nothing to their customers which would detract them from securing a goodly supply of this most healthy and luscious of fruits, the strawberry, and I think the time is at hand when a little more attention regarding the quality of the strawberries would not be out of place in order to further increase the consumption.

To come back to my topic I started out with: One is at times apt to be misunderstood. I am not at all averse to co operation; on the contrary, I am in perfect harmony with it, only I wish its drawback could be obviated. I have to illustrate this more forcibly, not in an unkindly spirit, but for the common good. Some of our growers failed to renew their old beds, and the consequence, as could be expected, was a lot of inferior fruit. Now, the commission man to whom the berries are sent is a very busy man at that time, and frequently the berries of half a dozen or a dozen growers are sold together at the same price, and the good berries of one grower helps out to increase the poor and inferior berries of the other fellow. Now for the remedy of this ill practice. One plan of those that have given this matter a good deal of thought, and it undoubtedly has much to commend it, is to make two or more grades. The pickers, without any additional expense or trouble (as I have been assured by those who helped to pick berries in this way), could make two grades. The berries from old neglected beds would have to be stamped second or third grade by an appointed inspector at the place of delivery, whose authority should not be questioned by anybody. It would probably be best to have the man who is to fill this responsible post to come from a distance, for the same reason that a prophet is not much esteemed in his own country, and two associations could exchange such men (as are above reproach). I enter into details purposely, as from these sometimes

depends the success of an enterprise. We cannot afford to feel unconcerned in this matter, lest the hen that lays the golden eggs should be killed. Let us push onward, for "where there is a will there is a way." It includes a good deal of work to raise small fruit, especially strawberries, and it is just as important to dispose of the fruit as it is to raise it, in order to save disappointments.

L. A. GOODMAN, Westport, Mo.:

DEAR SIR—I had intended to write on strawberry culture, but I find there has been much written on this subject to be almost confusing, and I could not, with the limited time I have, do it justice. On the other hand, writings on selling the fruit are not so plentiful. Earnest, up-to-date fruit-growers are invited to give their best thoughts on this subject, and if this question can be successfully solved, it will give fruit-growing an impetus as nothing else will.

Wishing you a good meeting, I am,

Respectfully yours,

E. LEITHOLD

WEDNESDAY, 8 p. m.

Meeting called to order by the President.

Music—Piano duet.

SOME USEFUL INSECTS AND THEIR PRODUCTS.

Mr. President, Gentlemen and Ladies—The subject assigned me on the program is "Our Insect Friends and Enemies," a sufficiently comprehensive theme which, in the allotted time, could only be covered in a very general way. For a change from the usual character of entomological papers, I have thought it might be agreeable to view the subject from the optimistic side, and to note the benefits for which we are indebted to the insect world, so far as we recognize them, as an offset to the injuries, concerning which we nowadays hear so much. I shall, therefore, at this time only attempt to catalogue some of the more prominent of our insect friends. As for our insect enemies, "that is another story," and Mr. Stedman has already told it in part.

In thinking of insects simply in relation to ourselves—in the light of the annoyance and loss they occasion us—we unwittingly do great injustice to an indispensable link in the great chain of organic being. We seldom remember—we do not even know—the countless indirect ways in which they contribute to the wellbeing of the higher orders of animals, which, in their turn, are necessary to the comfort or luxury of man.

The all-wise Creator, who fashioned these wondrously perfect, though tiny beings, did not do it simply to afflict the human family, although, as with many other agencies, they have been and no doubt

are still used for disciplinary purposes in ways which we do not always comprehend. Even the noxious species that temporarily cause us so much inconvenience and disappointment are valuable in creating habits of close observation, of patience, perseverance, industry and foresight and for stimulating invention. But surprising as the statement may seem to some, the vast majority of insect species have none but beneficent relations to the vegetable and animal kingdoms; fertilizing flowers, keeping down too exuberant plants, providing food for fish, birds and reptiles, and this outside of the few whose products man has learned to adopt to his needs or enjoyment.

When we take a philosophical view of the subject we recognize that the labor and trouble that man has with pernicious insects are largely the concomitants of his own enterprise and ambition. He interferes with the adjustments of nature, adapting her in a one sided way, to his own purposes, and when some of her laws, of which he did not take account—or would be in any case powerless to change—work out results that are inimical to his interests, he is surprised and imagines there is “some new soil under the sun.”

Our era has been termed the “Age of insects, and yet it is not probable that more species exist now than in the earliest period of recorded time.” Individuals have indeed been incomputably multiplied, but man, not nature, has provided the conditions. Insects that were once local have become universal—transported over plains and mountains by our railroads and across broad oceans by our swift steamers. The wide dissemination, not only of essential food plants, but of thousands of others that minister to luxury or the aesthetic tastes; the unnaturally abundant food supply in grain fields, gardens and orchards upon which millions of insects are bred, where tens would scarcely have found sustenance on wild grasses, herbs or native fruits, and more than all, the destruction of wild animals and birds that originally kept the too prolific grasshoppers, flies and catipillars in check are the modern agencies of insect-spread and multiplication. It will thus be seen that settlement and all the concomitants of high civilization have so disarranged the natural adjustments of animal and vegetable life that it is no wonder that certain species show disproportionate increase and vary in their habits to accommodate themselves to the new conditions.

Had man been able to take account of all the probabilities, he might, no doubt, have prevented to a considerable extent the evils from which he suffers. But with all the unfortunate experience of the last century, the fact is that he still neglects to take the precautionary measures that might save him from an aggravation of the same troubles.

But vast as is the sum of the losses from noxious insects, it is more than probable that the value of the products of the few directly useful species would more than offset them.

Consider for a moment our indebtedness to the Chinese silk worm (*"Bombyx mori"*). What other natural or artificially produced material can compare in beauty and durability with this exquisite fibre? What has lent itself in so many ways to the artistic manipulations of man? When we pause before our spacious shop-windows to feast our eyes on the lustre of intricately-woven brocades, the silvery sheen of satins or the luxurious pile of glowing velvets and plushes, or when, still more effectively we see these costly fabrics draping the graceful forms of youthful beauty, or adding to the elegance of stately dames; when we become bewildered among the list of other uses of supreme importance to which silk, in one form or another, is adapted, how incredible, how marvelous, that all this varied loveliness and strength should be but the transmutation of the pale and frail mulberry leaf! Verily, of all the laboratories of nature, the internal economy of the silk worm is certainly the most wonderful! Nor in this connection should we fail in our tribute of appreciation for the æsthetic inspirations of man in his dealing with this choice product. By the aid of artistic applications of color and form, involving the most ingenious mechanisms for their development, he has produced the very masterpieces of textile beauty and value, fit accompaniment of the diamond among jewels and of gold among metals.

There is a legend to the effect that it is to a Chinese princess that we are indebted for the discovery of the process of reeling the silk from the cocoons. How this came about we can only conjecture. It is probable that it was a mere accident—a child's play with the fluffy, golden and white balls by which, perhaps, the shining thread, becoming entangled around the little fingers, was, with some astonishment, drawn out to the length of a few yards. The fascination of the process would lead to its repetition, with a desire for greater success, until, to even the slow Oriental brain, would be suggested the application of moisture to loosen the gum that held the threads in place, and in this way the fundamental discovery of reeling the silk would be completed.

Spining and weaving were practiced even in that remote period, placed by some authorities, as far back as 2700 years before the Christian era, so it would not be long before the new fibre would find its way to the loom and take its place at the head of all textile materials. After this the camel trains from "far Cathay" would sometimes contain among their treasures small rolls of soft and shining stuffs that would

be weighed up to Persian monarchs and Phœnician merchants against the purest gold, and only used as apparel by the greatest personages and on the most important occasions. For more than two thousand years distant and exclusive China kept the derivation and manufacture of silk as one of her most important state secrets, and derived from it a very considerable part of her revenues. About the middle of the sixth century the secret was filched from her by two Christian monks, who, while directing the eyes of the heathen to spiritual matters, directed their own material vision to the source and methods of working up of silk, and, after much difficulty and artifice, contrived to secrete a few eggs and the seeds of the mulberry in their staves and in this way to convey them safely to Italy. In its new home the silk worm flourished even more than in its native land, and its culture rapidly spread over Italy, Spain, Portugal, France and Sicily, and become one of the most profitable industries of these countries.

Many attempts at silk culture have been made in America, but while both insects and plants flourish admirably in many localities, the cost in labor of producing the silk has been too great to enable it to compete with the raw silk of China, Japan and of Europe. But sericulturists are still sanguine that conditions will become such that it may be profitably produced in the United States. *Bombyx mori* is not the only species of caterpillar whose cocoon can be utilized to the needs of man. The "*Yama mai*," an immense Bombycid of Northern Japan, which feeds on oak and forms a very large and compact, sulphur yellow cocoon, is used by the Japanese in the production of what is called "Tusseh silk," not so fine and smooth as that of the silk worm proper, but exceedingly strong and glossy and well adapted to many kinds of goods. The Silanthus silk worm (*Samia cynthia*), which makes a smaller and more cylindrical cocoon, has also been quite successfully experimented with and has become naturalized in most of the coast cities south of New York. Our own grand Cecropia, whose loose meshed, glossy, brown cocoon is largest of all, has been found to yield an excellent quality of silk, so also has the larva of our lovely, delicate hued Luna, but much difficulty has been experienced in rearing these species in congregations sufficiently large to derive any profit from the product. But, with the necessity for more earnest attention and experiment, it is probable that all difficulties could be overcome, and all these excellent fibers utilized, in which case the insects, that are now regarded as pests, would become a source of revenue and the objects of intelligent care and interest.

Next to the silk worm in value ranks the honey bee (*Aphis nulifica*), the "Whiteman's fly," as it was called by the Indians, who, in early

days, noted the fact that it was never much in the van of the pale-faced aggressor. From the very earliest times the products of this insect were held in the highest esteem. Honey is frequently adverted to Holy Writ as one of the choicest luxuries, and is the theme of both poetry and prose of many of the classic authors. Before the discovery of sugar, the manufacture of which was not known in Europe until after the crusade, we can well imagine that honey was not only the ideal sweet, but that it was the only dependable source of that delectable flavor. And even in our own day, in which there are such a variety of sweets, its special character and incomparable excellence create for it an ever increasing demand. As is well known, the flavor, and to some extent the chemical composition, of honey depends upon the flowers from which the nectar is obtained. The celebrated honey of Mt. Hymettus, in ancient Attica, owed its delicate peculiarity to the wild thyme which covered the slopes of that historic hill, and tourists in the Swiss provinces of Norborne and Chamouni as they regale themselves on the honey that is invariably served with the matutinal and coffee are told that it is also made from the fragrant mints that are so abundant on the lower slopes of the Alps.

The heaths of England and Scotland and of other parts of the eastern continent also yield nectar of very characteristic and agreeable flavor. It is also well known that the honey of certain regions, though perfectly healthful to the bees, produces a deleterious effect upon man. Students of Greek will recall how in Xenophon's *Anabasis* the honey of Trebezond is said to have produced the effects of intoxication upon the entire army; and European travelers say that, even in our day, the honey of that province is inedible, retaining a poisonous property from the principal honey plant, a species of *Azalia*. This is somewhat remarkable, in view of the fact that honey is not merely collected nectar, but undergoes a regular manufacture in the *proventriculus* or honey crop of the insect.

The consumption of honey as food in Europe and America is very great. England, alone, besides her own product, imports from 50 to 100 tons annually. Of its amount and value in the United States I have no very recent statistics, but in 1881 the yield was estimated at 200,000,000 pounds, of which the money value would not fall below \$60,000,000. It is not probable that it is less at the present time. It is said that honey of various species of wild bees, which build their nests in trees, is the principal article of food of certain tribes of South American Indians. In Spain and southeastern Europe bee-keeping is one of the most profitable industries.

The uses of honey in medicine and the arts are multifarious. It

even assists in making some brands of chewing tobacco more irresistible than they otherwise would be to the devotees of the weed.

Another luxury for which we are indebted to the honey bee is wax. This is used chiefly in the manufacture of those most æsthetic and beautifying illuminants, wax candles. In our day of kerosene, gas and electricity the candle of any sort is simply a luxury, but as such, those made of wax are still largely used by the artistic and fashionable, and by the devout as native offerings before shrines of the Madonna and other potent saints. In the arts wax has some uses for which no other material is equal, and the demand, at prices profitable to the producer, has always been equal to the supply.

In considering the directly useful insects in the order of their importance to civilized man, we now come to those from which are obtained colors, lac, resins and coccus wax, which is very different in composition and in uses from beeswax. If I did not limit the species to those utilized by *civilized* man, I should proceed to enumerate the large number of insects which often preserve savage and semi-civilized man from starvation, but will leave these to be touched upon later.

Of the two properties of material things that appeal to the eye, viz.: form and color, it is difficult to say which most quickly asserts the attention, or which gives greatest satisfaction. Nor is it necessary that we should attempt to balance the claims of one against the other, as both are, in a measure, indispensable to our conception of every object in the universe. Harmonious colors are an essential element of æsthetic enjoyment, and their value is in no danger of depreciation so long as nature, with her magic pencil of sunbeams, keeps such a glowing and varied panorama ever before our eyes. And, as the eye of man revels in the celestial glories of the sunset, or swells restfully upon the blue of the sea, or the verdure of forest and field, what wonder is it that he seeks, with enthusiasm, the means of reproducing their beauty in his own comparatively, puny creations and combinations? To do this he has placed under contribution the mineral, vegetable and animal kingdoms; and with such success, that he is almost ready to challenge nature herself, to display a tint with which his art cannot vie. Among the most important of color producers are certain species of insects. These, almost without exception, belong to a group distinguished for its vast numbers and general destructiveness, viz.: the scale insects or bark-lice, and in the useful species man has found some compensation for the injury inflicted upon him by their predatory allies.

Associated with the Tyrian purple—the ancient badge of royalty—which was the secretion of a small mollusc, found along the shores of

Phœnicea and the Grecian Isles—was the almost equally noble, “scarlet” and “crimson,” often named in the Bible and other very ancient writings, as the most conspicuous and enduring of colors. These colors were also introduced into Egypt and the Eastern Monarchies by the enterprising Phœnicians, who obtained this “Kermes grain” or “Scarlet seed” from a small species of evergreen oak (*Quercus coccifera*.) which grows along the coasts of “Tarshish,” now Europe, and in many other parts of the world. The coloring matter in this, and in all similar species, resided in the dried, female scales, which, at certain seasons of the year, were brushed or scraped from the twigs and infused in water. Another very important “Kermes grain” is found in Poland and the western and northern shores of the Black sea, in the form of a scale insect on the roots of the knawel (*Scleranthus perennis*.) This is still used by the Turks and Armenians for dying silk and wool, and for staining the tips of the women’s fingers, producing the most beautiful rose colors.

Among the very first treasures sent back by the Spaniards from Mexico to their native country, early in the 16th century, was the wonderful cochineal insect (*Coccus cacti*), which, it was found produced nearly ten times as much coloring matter to the pound as any of the eastern scarlet seeds. This proved to be the most valuable of dying materials up to a very recent date, when the discovery of the aniline dyes, as one of the various products of coal tar, reduced its commercial importance. It is still, however, very largely used and is indispensable for tinting confectionery, preparing children’s paints and many other purposes for which the more or less poisonous mineral dyes are not adapted. It is in the form of a brown scale which feeds upon a cactus resembling our common prickly pear. At certain seasons of the year these scales are brushed from the plant with a squirrel’s or stag’s tail by the patient Indian women who will sometimes spend a half day collecting from a single plant. It is said that it takes 70,000 insects to weigh a pound. In 1856, before the mineral colors had usurped its place, the exportation of this precious scale from Mexico and the West Indies, to which it had been introduced, amounted to nearly 2,000,000 pounds.

Another very valuable product of certain coccids is a peculiar resin called lac. This is indispensable in the manufacture of many of the finest varnishes and sealing waxes, and especially so in the preparations of lacquers for coating brass and other metals. The insects secreting these useful scales live on a variety of trees in India and the substance is produced in great abundance and is one of the staple exports to the surrounding nations, as well as to Europe and America.

It is the secret of the beauty of much of the East Indian, Chinese and Japanese bric-a-bac and ornaments for the adornment of women. Mingled with a small proportion of cochineal some varieties of oriental lac yield a fine dye. It has homelier uses, too, such as the formation of grind stones when, combined with a certain sort of sand. An ink of peculiar properties is also made from lac, with the addition of lamp black and borax.

In China another and more rare species of scale insect excretes a very delicate white wax, called by the natives *pe la*; mingled with oil it forms a brilliant illuminant. It is also employed in the cure of various diseases, and is said to be very efficacious in giving assurance to timid orators, who swallow a lump of it when about to speak in public. Its use is, however, strictly reserved for royalty and the highest mandarins.

America has several species of lac coccids, which may, in time, be placed under contribution to the luxury or convenience of man. In the late Prof. Riley's report as U. S. entomologist for 1882, he mentions two lac insects of the southwestern states as meriting attention and experiment. One of these occurs on the Creosote plant (*Larrea Mexicana*), and another on a species of Mimosa; neither plant at present of any economic value; also a wax secreting insect on certain California oaks. It was his opinion that all of these insects might, by cultivation, be made to yield valuable and merchantable products.

In Chili there is produced by the bites of a small caterpillar, on a species of *Origanum*, such quantities of a peculiar resin, that it is largely used in ship building in the place of tar.

Mr. Charles Dudley Warner, in his "Mexican notes," asserts that brilliant and durable lacquer which makes the "Uruapen" ware so unique and so famous, is compounded mainly from the bodies of tree caterpillar. This "worm paste," the exact secret of which has not been divulged, is sold for two dollars per pound, but is not allowed to become an article of export from the province.

Another group of insects to which writers are especially indebted are some of the gall-making cynips. "Gall nuts" and "Aleppo galls" brought to Western Europe and America from the town of Aleppo and also from Smyrna and Trieste have long furnished black dyes of fine quality and formed the principal ingredient of all first-class writing inks.

In olden times, when the more nauseous the dose the more efficacious it was considered to be, insects had a very prominent place in the pharmacopœia of every physician. To quote from Kirby: "Powder of silk worms was the leading remedy for vertigo and convulsions; millepedes for jaundice; earwigs to strengthen the nerves (!); fly-water for disorders of the eyes; ticks for erysipelas; powdered gnats for de-

rangement of the stomach; lady-birds for cramps and measles; the cock-choper for the bite of mad dog and the plague." The learned and humorous author continues: "These good times are long gone by, but, after all, mankind are apt to run from one extreme to another. From having ascribed too much efficacy to insect remedies we may now ascribe too little. Many insects emit powerful odors, and some produce extraordinary effects upon the human frame, and it is an idea not altogether to be rejected, that they may concentrate into a smaller compass the properties and virtues of the plants upon which they feed and thus afford medicines more powerful in operation than the plants themselves."

At present medicine acknowledges but slight indebtedness to the insect world. One insect only could scarcely be spared by doctors and druggists. This is a medium-sized metallic green beetle, known to science as *cantharides vesicatoria* and popularly as "Spanish fly" or cantharides. It is largely used, not only to produce blisters, but forms an important ingredient in many internal remedies. It is also the most active principle of many popular lotions and stimulants for the hair. The cantharides used by physicians are imported, but we have in the United States a number of native species whose vesicatory properties have been experimented with and found to be, in many respects, even superior to those of the European species. Could these be substituted for the latter it would save the country one of its costly imports.

Another insect product indispensable to many chemical processes is formic acid. This was until a comparatively recent date obtained by distillation of red ants.

To us who are nourished on the best of meats, the finest grains and most luscious fruits, the idea of eating any form of insect life is utterly repugnant. And yet this repugnance is mere unreasonable prejudice, for we count among our choicest delicacies some animals that are far more repulsive of aspect than the majority of insects; such for instance as crabs, lobsters and shrimps, or even the much esteemed oyster.

As a matter of fact, insects have and still do figure as an important article of diet for many races and tribes, chiefly of savage people. The destructive locust of the eastern continent—a grasshopper as we should call it—about four times the size of our Rocky Mountain grasshopper, has been an almost staple article of food for the people of Southern Asia and Northern Africa. As this insect eats the more legitimate food of the human inhabitants, they have no resource in order to escape starvation but to eat in their turn, and by salting, smoking and roasting to preserve it for use for many months.

In 1877, when the western and southwestern states suffered so severely from the incursions of the Rocky Mountain grasshopper, Prof. Riley made quite extensive and varied experiments with them to ascertain their food value, and while no one who was regaled on his "locust feast" would choose the latter instead of the ordinary viands of a civilized table, still he demonstrated the fact that small and shelly as these grasshoppers are, they could be so prepared as to save human beings from starvation, while many of the lower animals, as is well known, fatten upon them with amazing rapidity.

Among the delicacies of the Greek table in ancient times were various preparations of *cicada*—insects of the same family and very similar to our so-called "17-year locust." These dishes are referred to by many classic writers in terms of the highest praise. In the same spirit of enterprise which induced him to test the value of the grasshopper, and to discover what ground the Greeks had for their appreciation, Prof. Riley instituted gastronomic experiments with this insect also, selecting for his *bisques* and fries the plump, cream-white larvae, or the soft-shelled pupae, just as they emerged from the soil, and under the manipulations of a skilled cook, several excellent dishes were served, which were apparantly much enjoyed by those invited to partake. But as this insect appears only at such long intervals and is not seriously destructive to vegetation, we cannot expect it ever to become a staple article of food.

It is chiefly in Africa and South America that insect eating is with certain tribes a constant practice. The species thus utilized are mainly white ants (*Termes*), and a considerable variety of tree-boring grubs. Some of the latter, which are found in the terminal buds of the cocoanut palm, are said be peculiarly fine flavored and nutritious.

The white ants of certain districts of Africa are described as building regular cities, with compact clay towers rising to a height of from 25 to 30 feet. In these are often found stored a considerable quantity of the wild grains of the locality. The discovery of such a termite city is always hailed with joy by the savages, who stupefy the inmates with smoke and afterwards eat them, together with the grain which they had collected. The Indians of the southwest coast are often saved from starvation by the ability to eat certain insects, and one or two species of the latter are regarded as choice delicacies.

The insects enumerated will suffice to show that man has found even in this lowly and individually insignificant class of beings some that contribute to his material wealth and enjoyment. But we have many insect friends that do us good service in a thousand ways of which we are not aware. Many are scavengers and devour or bury

decaying animal or vegetable matter that would load the air with poisonous germs. Others are predaceous and destroy multitudes of pests that annoy us in person or ravage the products of our fields and gardens. Still, others are parasitic, and assist us to an extent which we cannot compute in keeping in check the most pernicious vegetable feeders. The importance of becoming acquainted with these small but serviceable friends of ours can scarcely be over-rated. As yet, in nine cases out of ten, they are looked upon as the depredators and ruthlessly destroyed.

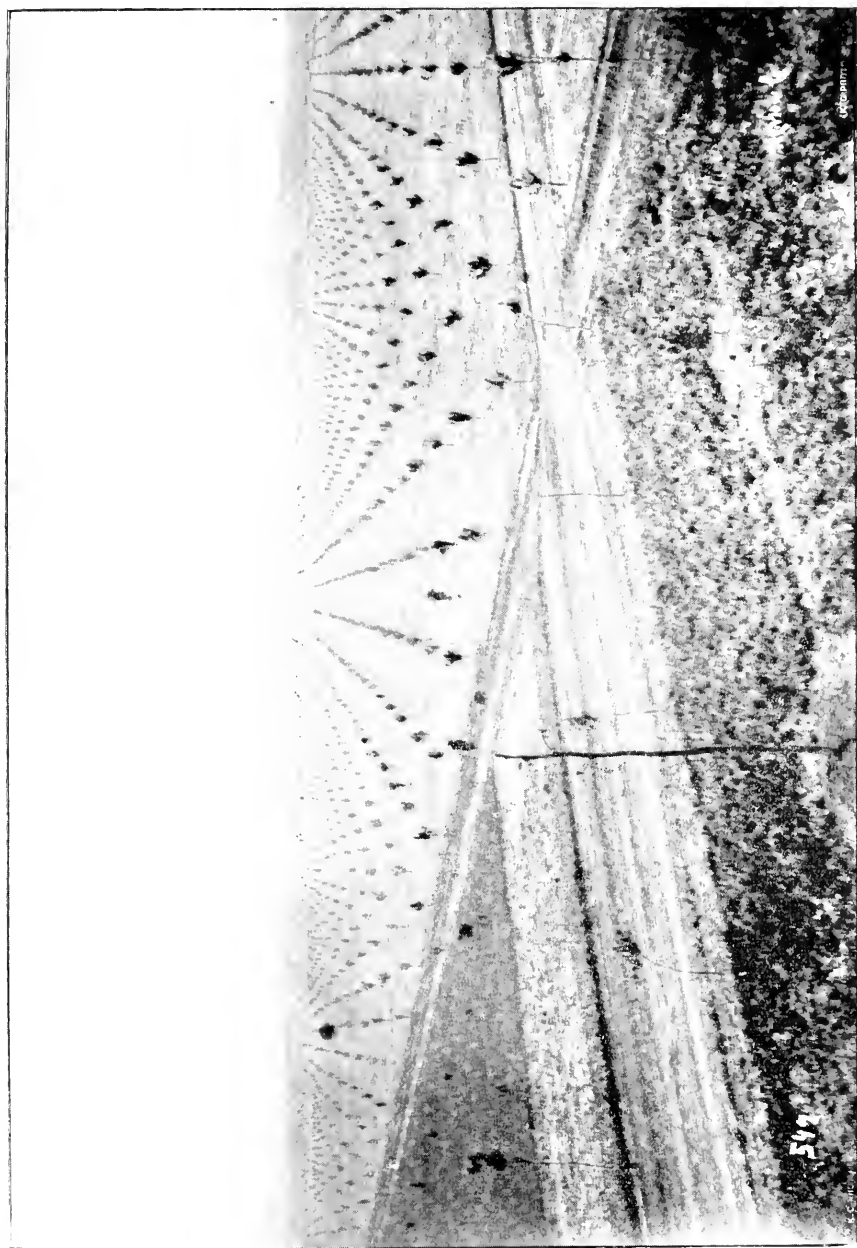
One lady last spring told me with great satisfaction that she had found the fly that laid the eggs from which the plant lice on her roses hatched. She showed me the culprit. It was a lace wing fly, which was busy placing its eggs, each on its slender stalk, among a colony of the lice. She did not know that its larvae would have speedily cleared the bush of the sap-sucking aphides. Another friend had her gardner busy for days searching for and killing the aligator-shaped larvae of the lady-bug beetles which were helping to save her honey-suckles from destruction.

We have still much to learn of insect life and its adaptabilities, and now that so much attention is being paid to it we can but hope that not only shall we learn to conquer our foes but that we may add many species to our list of friends.

MARY E. MURTFELDT, Kirkwood, Mo.

DISCUSSION.

Mr. Dubois—I don't attend this Society very often; this the first time in about a hundred years, so I hope you will allow me a little time. When horticulture was in need of a great exponent, the Fruit-Growers' Journal came to the front; when human rights required a Lincoln, a Lincoln came to the front; when potato bugs and other insects became so plentiful that our crops were threatened with extermination, then the male entomologist came to the front. They are generally poor in this world's goods, but I hope they have treasure laid up where no bugs can bother. When the males were about to fail, the lady entomologist came to the front. Of these Missouri has one of the best. I think our male entomologists would not be entirely happy, even in heaven, without a codling moth or a San Jose scale; and perhaps the lady entomologist would not be entirely happy without a lady-bug or a silk worm.



A YOUNG APPLE ORCHARD ON MISSOURI PRAIRIE.

CULTIVATION OF YOUNG TREES.

Mr. President—The subject assigned me by your Secretary is “The Cultivation of Young Trees.” It is my purpose to treat this subject, not from a merely theoretical standpoint, but chiefly from a practical point of view. I know of no better way to tell you how I would cultivate young trees than to tell you how I have cultivated them.

Five years ago I bought two tracts of land, one of 96 acres and the other of 37. The larger tract is located on a high ridge, formerly covered with a heavy growth of timber, chiefly hickory, oak and elm. But the larger portion had been in cultivation about 30 years. Some, however, was still covered with timber. The land is fairly rich, but I selected it because of its porous subsoil, rather than the fertility of the top soil. The smaller piece is located on the bluffs of Grand river, a portion extending into the bottom. This piece is very sandy, the soil on the ridges being of a light, ashy color, not good for grain, and formerly covered with white oak timber. The bottom is a rich, black loam, with a very sandy subsoil.

After the purchase I proceeded to make these tracts ready for trees, which I did by preparing the land for corn. However, I had purchased 3,000 apple trees in the fall and “heeled” them in, ready for the spring set. I bought two year-old trees, 2,000 of one man and 1,000 of another. One nursery was located about sixty miles distant, and the other about twenty-five miles. When the trees came I opened the boxes and found that the trees of the thousand lot were much larger than those of the two-thousand lot. I was proud of these trees, but there lurked a suspicion within me that they were more than two years old. I was assured, however, that the tops were two years old and the roots three. I am still satisfied that the tops were at least two years old. They were fine, however; I mean they were large. The trees had been trimmed about waist high to a tall man, an unusual thing with two-year-old trees. The limbs, which had many side branches, were pressed into the boxes so closely as to crack the bark near the body of the tree. The limbs were alive at first, but were not all thus in three months after setting. As a result the laps, already much too high, were made higher, and often the limbs on the south side died, leaving the trees in bad shape. Before I knew what would happen, I set these fine large trees near the public road. I wanted people to see what a fine lot of trees I had. I set the other lot out in

the middle or the field. They were two-year-old trees that had been growing on thin soil *but two years*, and were not overgrown culls, three or four years old, with tall laps and bad roots. It is needless to tell you where my fine trees are now. It is further needless to say that I want no more large trees shipped in boxes. I have since bought and set about 6,000 trees, some one year old, some two, some three, and some even four. My worst luck was with the one-year-old trees, and my best luck with twos, although I have had good luck with three-year-old trees when I selected them in the nursery and had them delivered in hay-racks on wagons.

I prepared a track, say forty acres, by dividing the opposite sides into equal portions by means of a measuring line, setting pegs where each row of trees should end. I then subdivided this again and again, by setting stakes within the tract to be set, till I separated it into blocks of about 100 trees. I then took faths and placed them on two sides of this block, while pegs were placed on the two other sides. I then proceeded, with the help of one or two men, better with two, to place small pegs where each tree was to be set. After these blocks were thus made ready, I prepared a narrow board for each man who was to set the trees. This board was about six feet long, with an inch hole in each end and a deep notch in the exact center. Two headless pins were prepared for the ends of each board. The notch was then placed by the planter against the pin where the tree was to stand. The headless pins were stuck through the inch holes in the board, and were fixed firmly into the ground. The board was then removed, leaving the inch pins in the ground, the hole was dug with a spade, the tree was placed in the hole, the plank was placed in its former place, the tree was brought into the notch, the dirt was carefully pressed around the roots with the hands till the tree was firm in its place, the plank was again removed, and the work was finished with the spade and feet, always leaving the ground firm about the tree. I set the trees only about an inch deeper than they were in the nursery, but drew the dirt around the tree considerably higher than the general level of the surrounding land. This is especially necessary if the setting is done in the fall. All things considered, I prefer to set in the spring.

After setting the first lot of 3,000, I was told that it would be a good thing to get elm board wraps to keep off rabbits and borers. But I learned to my loss that these same wraps were the finest of harbors for mice and the woolly aphis, and I lost more trees from the ravages of mice than I have ever lost from rabbits. It is fair to say, however, that I have not given the rabbits the same favorable oppor-

tunity. The woolly aphid, with the appearance of cotton, covered the trunks of many trees, and caused excrescences to grow upon the trees to their decided damage. But this was not all, nor even the worst. The borers, instead of being afraid of the dark holes made by these wraps, found a most convenient place to deposit their eggs. I soon found that I must remove the wraps and take out the borers, or I would soon have but few trees. I removed the wraps, and picked out the borers two or three times during the summer. The temptation was strong to discover the borers without entirely removing the wraps, and as a result many were left and a large number of trees was injured, some being entirely killed.

While upon this subject, I may just as well say that borers are numerous in these parts. The greatest number we have ever taken from one tree is 36, although it is common to find a dozen or more. In the spring I remove the dirt from the base of the trees and examine with the utmost care to find any borers that may have been left in the fall. In about 7,000 trees we usually find about 25 "worms" that have been accidentally left in the fall. This work is done as soon as the ground is in good condition in the spring, care being taken not to make the ground too loose near the tree, as the rains will soak this loose dirt full of water, and the winds will cause the tree to become loose in the ground. It has cost me a good deal of money to keep the trees from leaning or causing holes in the dirt around the base. But this difficulty is largely remedied by drawing the dirt to the trees, making a neat hill about nine inches high. The chief advantage of the hill, however, is to compel the beetle to deposit its eggs above the level of the ground. This hill will gradually become lower through the summer. When the trees are hoed, the utmost care is taken not to elevate the hill the fraction of an inch above where it is found, as the eggs of the beetle might thereby be placed below the surface of the ground. These beetles deposit their eggs but a short distance above the surface of the ground. These places are easily detected, having much the appearance of a small wound made by inserting a pen-knife into the bark of a tree. Should these places be fresh, usually about June or July, it occasionally happens that the sudden jarring of the tree will bring to the ground the author of the mischief. It is a beetle, popularly called a "bug," somewhat larger and harder than a lightning "bug." It has very long antennae, or "horns," which remind one of the horns of a goat. It is of a dull lead color with two milk-white stripes along the back almost the entire length.

Along about the middle of July, depending somewhat upon the season, the young borers have begun to develop. Take a butcher knife, or if the ground is hard take a hoe, and also a good, keen, sharp pointed pocket knife. There will usually be little need to search below the surface if the trees have been properly managed in the spring. But to make sure that none are below the surface, the dirt is removed from the trunk two or three inches, and again returned after a thorough examination. But more than ninety per cent will be several inches above the general level of the ground, and can be removed in a very short time. A good hand can "worm" about a thousand trees, five years old and younger, in a day, and will often find more than a thousand "worms." In three or four weeks the same process is repeated to catch what may have been left, and also those hatched later. Again about the last of September the trees are carefully examined for winter quarters, and the few that have escaped are taken out. This last work will probably not leave more than twenty-five borers in seven thousand trees, and these are usually undeveloped.

I have no faith whatever in wire screens or wraps made of cloth or wood, as a preventive to borers. I have seen them tried and found wanting. Furthermore, I have but little faith in washes. Doubtless they do sometimes help, and are, if the right kind, beneficial to the trees. But I have unbounded faith in two keen eyes and a good, sharp knife industriously applied.

To protect from rabbits I have tried elm wraps, paper, lime wash and corn stalks. The elm wraps invite mice and the woolly aphis; paper becomes wet and the wind blows it off; the rabbits seem to like the lime and eat the trees with more avidity, if possible, than if no lime were on them; but corn stalks stuck well into the ground, and well tied near the top with twine are satisfactory. It cost me now about three dollars a thousand to protect with stalks. Grease, blood and some other substances will keep off rabbits as long as they remain on; but before one is aware of it the substances are washed off and the rabbits have killed your trees; or an old sow comes along and makes a good square meal of the grease and blood on them.

Thus far I have usually cultivated corn in the young orchard. My trees, most of them, are set twenty-seven feet apart. This gives room for six rows of corn between the rows of trees and one row of corn in the row of trees. When small, each tree takes the place of just one hill of corn, and does not damage any other hills. In this way the marker can go twice between the rows of trees, and the corn planter three times. It is then necessary to plant but one row in seven with a hand planter. I cultivate six rows with a common two-horse

cultivator and the seventh row with a common double shovel. Care at all times is taken not to plow too deep near the trees; and yet, the roots should not be allowed to run too near the surface, as in dry weather the trees would be damaged. The plow does most of the culture, but the hoe is also brought into service. I hoe my trees as carefully as the gardener hoes his cabbage. Not a spear of grass is allowed to grow near the trees. In this way I am able to guard against mice, and easily to see any borers that enter the trunks of the trees. We are troubled but little with the flat-head borer, unless the trees become stunted, and then I promptly cut them down. I have destroyed well-nigh two thousand trees, including what have died from other causes. It is poor economy to cultivate stunted trees. I found this to be true when I set a few hundred three-year-old trees about the size of common trees a year younger. I have destroyed, perhaps, one-third of them, and it would have been economy to have destroyed about another third.

I have learned that very rich new ground is not best for young trees. The light, loose soil filled with roots and sticks does not furnish a suitable place for starting new roots. Furthermore, the corn grows very rank and tends to check the growth of the trees. Dry weather comes and the tree is stunted. The bark becomes hard and dry and flat-heads attacks the trees. There remains nothing to do but to dig them out and replace them with other trees.

I have found low laps, not forks, to be the ideal. The bodies are thus protected from the sun, and are much more thrifty than trees with high laps. Besides, the labor of harvesting is materially lessened by having as much fruit as possible within reach of the ground. I may as well add here that I prune but little. I get trees, as far as I can, with plenty of lap and a center stem. I prune but little when I set. I have found that it is useless to prune heavily, as the trees with large laps live just as well as those with smaller laps, if the roots are good. Again, it injures a tree to cover its body with wounds made by cutting the branches off. Especially would I refrain from the somewhat common practice of cutting off the ends of the limbs. After the tree is set, I trim just enough to avoid forks, one-sided trees, and cross limbs which are liable to rub. In this way nature forms a nice top without water sprouts. A young man searched my orchard for half an hour to find a single water-sprout and found none. He said it kept his father busy about all summer to keep the water-sprouts off about a thousand young trees. His father believes that pruning makes a tree grow. He would object, however, if some one should advise him to cut off some of his fingers and toes in order that his health might be improved. These

cases are not strictly analagous, and yet wounds in either the animal or vegetable kingdom are not essential to the well-being of the individual.

As to the value of the foregoing, the orchard is hear to bear witness. All admit it to be one of the finest, if not the finest, of its size in this section of country. I have not yet received large returns in fruit, but quite as large as I desire. My object is to grow good, thrifty trees, and the fruit will surely come bye and bye. A few of my trees bore over a bushel each this year, and hundreds had a few apples each. The orchard consists of about 5,000 Ben Davis, 1,000 Willow Twig and 1,000 Jonathan, besides a variety orchard of about 200 trees. This does not include peaches, pears, plums and cherries.

In conclusion, I will say that the plan given above is the plan I have followed, and not the result of the imagination; nor is copied from some journal or horticultural report. These rules doubtless can be improved upon, even for this section of country, and must of necessity be materially changed for other localities. This plan has been carried out principally by good hired help, my duties in the Chillicothe Normal occupying my time except a sufficient amount to oversee the work.

G. A. SMITH, Chillicothe, Mo.

The following paper was presented by J. W. Rouse of Mexico, Mo., and was taken from the American Bee Journal from its report of the United States Bee-keepers Union, Buffalo convention:

RELATION OF BEES TO HORTICULTURE.

There is a widespread prejudice against the honey-bee. Why? I want to explain to you as well as I can in the few minutes allowed me, facts that go to show that the prejudice is unfounded, and that the honey-bee is the greatest friend of the fruit-grower, if not indispensable to successful horticulture.

There is in plants or flowers what answers to sex in animals. Sometimes both sexes exist in the same flower, sometimes in different flowers of the same plant, sometimes on separate plants. But whatever the plan of growth, fruitfulness depends upon the fertilization or pollination of the pistil by the grains of pollen produced on the stamen. The stigma, generally the upper part of the pistil, is a part denuded of the epidermis, touched with a viscid (sticky) substance, and when the proper pollen adheres to this part the pollen puts forth pollen-tubes which lengthen till they reach the ovaules, which completes fertilization and causes fruit or seed to grow.

In our fruits generally both pistil and stamens are present in the same flower, though there are exceptions. Under such circumstances one's first thought, perhaps, would be that there could be no difficulty in securing thorough pollination.

But we have other principles to reckon with. Nature abhors in-breeding, and resorts to various devices to prevent it, the most familiar one being the "ripening" of the two parts of the flower at different times, and pollen from the same flower in most cases has a much less potent influence on the pistil, if indeed it has any at all.

But you may ask: Are not our fruits exceptions in this matter? Let facts answer:

Prof. A. Cook carefully experimented with the bloom of the apple, crab apple, pear, cherry, strawberry, raspberry and clover. In some cases the experiment was duplicated or triplicated. In each particular case an equal number of blossoms were selected from adjacent branches. One lot was marked with a tag, the other surrounded by cheese-cloth. I cannot enter into details, but these are the results:

	Blooms.	Covered fruits.	Uncover'd fruits.
Apple	40	.....	15
Apple.....	75	.....	3
Crab apple..	200	.....	3
Apple.....	160	2	9
Pear.	140	.....	7
Cherry... ..	300	9	119
Strawberries.....	60	9	27
Strawberries.....	212	80	104
Strawberries.....	123	20	36
Raspberries	184	93	160
Clover (red).....	h'ds 10	.....	191
Clover (white)	h'ds 10	.....	541

Again, in 1894, since his removal to California, Prof. Cook made similar experiments with plums, cherries and pears. Two plum trees, one cherry and two pear trees were made use of in the experiment. On each tree three lots of blossoms were selected instead of two (as in the other case), the number of blossoms varying in each tree from 32 upward, the lots on any one tree of course having an equal number. One lot on each tree was left uncovered, the second lot was covered, but with bees introduced under the covering, and the third lot was covered, excluding all bees. All proper precautions were taken to secure reliable results. The result was that there was not a single fruit

on any of the twigs from which bees were shut out. On the twigs covered with sacks, into which bees were put, there were on the plums three and five, the cherry five, on the pears six and eight respectively. On the uncovered branches of the plums were eight and five, the cherry seven, and the pears eight and eleven:

	Bees enclosed.	Not covered.
Plums.....	3	8
Cherry.....	5	5
Pears.....	5	7
	6	8
	8	11

From one-fourth to one-twentieth only developed fruit, but this fortunately is always so.

What makes these experiments all the more favorable to the bee is that many small insects, called thrips, were noticed on the bloom inside the coverings, yet though they must have carried pollen from another to stigma, and from blossom to blossom, yet without so much as pollinating one pistil.

In one experiment with the plum, Prof. Cook covered a branch, and when it was in bloom, and the bees working in force on the trees, he removed the sack, and keeping watch marked the blossoms on which he saw bees work. When he ceased watching the branch was re-covered, and at length the four blossoms alone on which he saw bees alight developed into plums.

No doubt some varieties of our common fruits are self-fertile, but none the less should cross-fertilization be sought, for the great advantage of it, even where flowers are self-fertile, is abundantly proved by Darwin and others.

It is to be noted that cross-pollination is accomplished only by the application of the pollen of one variety to the pistils of another variety. Cross-pollination cannot be effected between two trees of Baldwins. All Baldwins are in effect one tree, so of other varieties. Hence the pertinancy of the advice of Mr. M. B. Waite, endorsed by Prof. Cook.

“Plant mixed orchards, or at least avoid planting solid blocks of one variety. It is not desirable to have more than three or four rows of one variety together unless experience has shown it to be perfectly self-fertile.”

In this connection I quote Prof. Barrows; he says of apples: Most varieties are practically self-sterile, and so far as we know now are completely self-fertile. In what way is cross-pollination best accomplished? In some cases this is well done by the wind (as in corn and

the pine). But with our fruits this agency must be very uncertain and ineffectual. And perhaps that fruit blooms fail to become pollinated when the weather is too cool for insects to move goes to show the same thing. Our chief and only safe reliance for the performance of this function must be upon insects. But insects differ greatly both in numbers and activity.

During the time when Prof. Cook was making the first experiment I referred to, he made observations to determine the comparative numbers of different insects to be found upon the blossoms, and he estimated that at that time there were 20 honey bees to one of all other kinds at work on the bloom. In his California experiments he found there were 100 bees so engaged to one of all other kinds. I think this last—100 to 1—would be nearer the rule in Michigan in the neighborhood of an apiary of any considerable size. Then if we consider the immensely greater activity of the bee over that of most other insects, darting like a shot from flower to flower, and from tree to tree, the conclusion is inevitable that we must rely chiefly for cross-fertilization on the bee.

Busy bee, pray tell me why,
Thus from flower to flower you fly,
Culling sweets the live-long day,
Never leaving off to play.

We know the answer so far as it immediately concerns the bee, but if that were the only reason, why does the flower that lasts but for two or three days secrete the nectar that attracts the bee, instead of the leaf, which endures for the season, and which could therefore so much better serve her? Nature made no mistake; the welfare of the bee was not the first consideration.

Notwithstanding all this, there is undoubtedly, as I stated at the outset, a prejudice against bees, and for these reasons:

First—Because of a belief that the bees take something from the plant that will render it less productive; or something that is of value to the grower of the plant.

What I have already said shows the fallacy of the first branch of this belief, and as to the other branch of it I have this to say, that bees gather from domestic plants nectar and pollen only. The nectar of clover, for instance, can never be of any value to the farmer. A shower washes the blossoms so thoroughly that the bees do not work on them for several hours afterward. The nectar in that case, to be sure, goes into the soil, but any well-informed chemist would tell you that it has no value even as a fertilizer. The pollen, in like manner, if ungathered, would go into the soil, and there it would have some value

as a manure, equal for that purpose to perhaps about the same quality of bran, and in no case could it amount to more than a few pounds from a large farm.

Some are so constituted that they could bear the loss with equanimity if they knew it was occasioned by bees from the woods, but would be grievously disturbed if they were conscious that it was carried to the hives of a neighbor. But I have never known a fruit-grower made on that plan.

2nd. Because of a belief that bees are continually moved by a desire to sting. This is a great mistake. Bees absolutely never volunteer to sting when absent from their hives, but if caught in the hand or hair, or otherwise, they will try to sting, of course. But bees are tolerably quick in resenting any disturbance that threatens injury to their homes, yet with fair discretion they are wonderfully easy to get along with. But if I were not familiar with bees I would not kick over a live hive in summer time, nor operate a heavy road-scraper on dry, stony ground within three or four rods of an apiary, nor hitch a team where bees were passing and repassing (even though I were one of that class whom bees never sting), without taking the advice of some one skilled in the management of bees.

3rd. And last, because of a belief that bees do injury to ripe fruit.

There is no question that during times of dearth of nectar in warm weather that bees seek to gather the juices of broken fruit, and some fruit-growers contend that they actually cut through the skin of the grape—some are very positive, affirming that they know they do—that they have actually witnessed the operation. I feel some sympathy for this class, since once, though familiar with the arguments against it, I was more than half inclined to believe that in some way bees sometimes forced open the skin of grapes. For years I have taken great pleasure in raising a considerable variety of grapes, and when I sometimes saw the bees crowding their heads between the berries of fine, compact and apparently perfect bunches of Delawares, and afterwards found that many of the berries were sucked dry, my faith in the bees' inability weakened greatly.

Further investigation showed that, while ruptures of the skin of the Duchess grape were plainly seen, none were ordinarily evident in a ruptured Delaware. In short, I found that grapes of different varieties varied in their manner of cracking—some cracking lengthwise, and others crosswise or diagonally.

The cracking is, I think, caused by the crowding of the berries upon each other, which is induced by their swelling, owing to abund-

ant moisture. At least so far as I have observed, the cracking is confined almost entirely to compact clusters.

Of the many varieties I have in bearing the work of the bees has usually been confined almost exclusively to the Delaware and the Lady; but on account of the wetness of the season, the Duchess and the Salem were added to the list last year, and these are the ones to which cracking was almost exclusively confined. It was a significant fact that the work of the bees was confined to the compact clusters of these varieties, while the loose clusters neither cracked nor were visited by bees.

In all these, except the Delaware, the cracks were plainly seen on the visible part of the berries. In the Delaware the cracks are out of sight, being transverse and near the stem end.

In July last, the rainfall being so great that more than the usual amount of cracking was anticipated, I decided to determine, if possible, whether grapes from which bees were excluded, but still left on the vines, suffered in any different degree from those to which the bees had free access. To shut out the bees paper sacks were used, folded over the clusters and pinned. More than a thousand sacks were put upon grapes of the thirteen varieties I am about to mention. Many of these became ripe early in September, and by the 24th all were ripe except Jefferson and Iona.

In the case of the following there was no damage either inside the bags or out, viz: The Agawam, Eaton, Enmelan, Iona, Lindly, Niagara and Ulster. Brighton suffered none in the sacks, little out; the Diamond, a little in and a little out; the Jefferson, a very little in and the same out; the Delaware, Duchess and Salem suffered much in and somewhat less out.

In the case of the three kinds much injured it became constantly more evident that the damage to those in the bags was greater than to those to which the bees had access. This was especially true of the Duchess and the Delaware. So evident was it that the reason of this lay in the fact that the juice oozing from the cracked grapes in the bags was communicated to contiguous sound grapes, causing weakness of skin, cracking and incipient decay, that by the middle of the month of September I hastened to remove the bags from these varieties that the bees might gather the juice from the broken grapes.

To my mind the conclusion is inevitable that not only do bees not injure grapes, but that by gathering the juice of cracked ones they prevent decay and thereby the destruction of sound grapes.

R. L. TAYLOR.

DISCUSSION.

Dr. C. C. Miller—I don't believe there is much good that can come from our discussing this paper, but it would do lots of good if it could be laid before the horticultural class. It might be put in our home papers or brought up at our farmers' institutes and do good in that way.

Rev. E. T. Abbott—There is one more point that ought to be brought out, and that is that secretion of nectar stops as soon as the blossom is fertilized, the same as the extra energy of a female animal is turned to the production of a new life in reproduction.

E. R. Root—If no one else does anything about this matter we will get out Mr. Taylor's paper in the form of a leaflet and give it away.

Mr. Abbott—Can't this association do something to prevent the spraying of trees while in bloom?

R. F. Holterman—We now have in Ontario a law against the spraying of trees while in bloom. The outer covering of the fertilizing part of blossoms is very tender, and to spray when in bloom, even with water, may work an injury, hence those who spray when the trees are in bloom are destroying their own fruit.

W. Helm—In Ohio the experiment stations are issuing bulletins in regard to spraying, and but very little of it is done out of season.

THURSDAY, 9 A. M.

The President called the meeting to order.

Prayer by Rev. A. F. Smith.

The President introduced the Secretary of the Illinois State Horticultural Society, Hon. H. L. Dunlap.

Our apple crop has brought Missouri and Illinois to the front. We are very fortunate this year. In other years when all our orchards come to bearing we will have to look for other and greater markets. Storage and transportation are great questions, and will become greater. Last evening at the hotel in St. Louis, where I took supper, they had strawberries. In Chicago, string beans, young turnips and other green vegetables are on the market. So you see, we must compete with the products of all climes, and cannot expect high prices except in seasons like this. Cold storage in the large cities is important, but expensive. The grower must trust to others to care for and sell his products and return or pocket his money. We need a good storage plan for the grower or a neighborhood, so we could hold our crops for profitable prices.

In Illinois we have had good prices, but the grower does not get the full benefit, for he had to sell.

We will be very glad to receive your delegates at the Illinois Society, and will treat them as well as Illinois people know how.

President Evans—We are now ready to receive invitations for the next meeting and discuss them.

Secretary Goodman—I have here an invitation for the June meeting from the local society at West Plains.

We, the undersigned, beg your honorable body, the Missouri State Horticultural Society, to hold your summer meeting next June at West Plains, Mo., pledging you our hearty support by our presence and as reasonable hotel and railroad rates as can be had anywhere.

Ald Hardware Co.,	C. F. Coleman,
Geo. C. Dougherty,	H. G. Woolsey,
John B. Black,	F. J. Moxey,
G. D. Ellecye,	C. I. Lee & Co.,
Geo. T. Lewis,	J. W. Martin,
H. P. White,	Wiley Thorne,
S. T. Russell,	J. E. Springer,
T. J. Pitts,	Livingston & Lives,
Wesley Simmons,	Hill-Whitmire Mer Co.,
G. H. Carter,	D. W. Reese,
W. H. Odum & Co.,	J. L. Elledge,
R. M. Hornldy,	S. C. Minnebraker,
E. M. Paage & Co.,	F. Ball,
S. H. Coover,	William Revney,
John Halstead,	L. G. Perry,
Wm. P. Cutler,	Ed. Coker,
C. V. Crawford,	S. M. Cady,
Swartz & Horton,	C. M. Podas,
S. J. Langston Mer. Co.	Funkhouse & Davis,
Penick & McCollum,	G. C. Marsden & Co.,
Oscar Weller,	B. T. Henry,
A. J. Spear,	S. J. Helt,
B. H. Haley,	C. G. Brown,
B. B. Carter,	Shadburn Bros.,
V. P. Wells,	A. J. Stephens,
M. J. Buford,	H. Timberman & Co.,
V. P. Renfrow,	J. T. Outen,
T. J. Langston,	Dressler, Stous & Co.,
Kansas City Prod. Co.,	West Plains Drug Co.,
Jno. W. Hitt,	James L. McKaney,
Phillip Corgan,	John T. Snodgrass,

To the Honorable, the Missouri State Horticultural Society:

We, the undersigned citizens and fruit-growers of Oregon county, respectfully request that your summer meeting next June be held at West Plains, in Howell county.

Should this request be complied with, we pledge you our attendance during the session, and that we will unite with the citizens of West Plains in giving your members in attendance from other parts of the State a hearty welcome.

A. P. Campbell,	C. M. Alderson,
H. K. Alderson,	F. M. Arnold,
H. C. Middleton,	W. C. Paynter,
T. M. Culver,	E. Leach,
J. T. McCormack,	L. S. Wilson,
J. D. Wilkerson,	

KANSAS CITY, MO., December 2, 1897.

John T. Snodgrass, Esq., West Plains, Mo.:

DEAR SIR—Referring to your letter to Mr. Washburn, relative to rate to be made by our company for the delegates who will desire to attend the meeting of the Fruit-growers' Association, you may say that we will make a rate of one fare for the round trip from any point on our line to the meeting point. We will, however, desire a list of the names of the delegates furnished us, so that we may send each delegate who will pass over our road an order on the ticket agent to sell him a ticket for the round-trip at one fare. We desire to handle it in this manner rather than to make an open published rate available for the use of everybody. I believe the plan has been the one that we have heretofore used, and it enables us to confine the application of the rates to the legitimate delegates.

Trusting you may be successful in your efforts to get the meeting, I am

Yours very truly,

JAMES J. FLETCHER.

The invitation was accepted and West Plains chosen as the place for the next meeting.

Mexico and Moberly asked for the next winter meeting.

COLUMBIA, MO., December 20, 1897.

Hon. L. A. Goodman, Westport, Mo.:

MY DEAR MR. GOODMAN—I am sorry that I was not able to attend the Moberly meeting of the State Horticultural Society. I present an invitation to the Society to meet at Columbia next December. The Board of Curators authorized this invitation to be extended, and the President of the University, together with all the faculties, the officers of the Experiment Station, and the citizens of Columbia join the Board in this most cordial invitation. I know you will agree with me that it will be of benefit to both the members of the Society and the Agricultural College and Experiment Station to have the meeting here. There is considerable interest being awakened in horticulture in this section, and your meeting here will greatly stimulate it. I hope, therefore, that you can see your way clear to favor Columbia for the next winter meeting.

We are doing everything we can to reach the horticulturists with our short course in horticulture, and hope to have a good attendance.

With best wishes, I am,

Very truly yours,

H. J. WATERS,

Dean and Director.

Moved and carried that choice of place for winter meeting be left to the Executive Committee.

COLUMBIA, MO., Dec. 27, 1897.

Hon. L. A. Goodman, Westport, Mo.:

MY DEAR SIR—Kindly do all you can to secure the next winter meeting of the State Horticultural Society in Columbia. The Board of Curators have extended a cordial welcome, and urge that the meeting be held here. Likewise the President, Director Waters and Faculty unite in this request. You know the many advantages of holding a meeting here, so I will not dwell on them.

Very respectfully yours,

J. M. STEDMAN.

We, the Committee on Flowers and Plants, respectfully submit the following report

To Mrs. N. F. Murray, 4 vases of chrysanthemums.....	\$1 00
Henry Schnell, 2 vases of "mums."	50
Mrs. H. V. Esfill, 1 orange tree and other plants.....	1 50
Mrs. W. H. H. Day, collection of plants	15 00
Mrs. Chris. Gootgon, palm and plants	2 00
Total.	20 00

SAM'L MILLER, Chairman,
 Mrs. A. NELSON,
 Mrs. A. CHANDLER,
 Committee.

We, your Committee on Finance, have examined the report of your Treasurer and find vouchers for each and every account as stated in his report, and report correct in every particular.

D. A. ROBNETT, Chairman,
 N. F. MURRAY,
 J. T. SNODGRASS.

C. C. Bell, Committee on Sugar Beet—At Marceline one year ago I was appointed to investigate the sugar beet industry. I took the resolutions to Canton, Ohio, to President-elect McKinley. He was very busy, but he was very much interested in the step this Society had taken. He read the resolutions over carefully. He said he was glad we had started the matter, promised to do all he could through the Department of Agriculture and made an appointment for me to see him at Washington after his inauguration. Accordingly, I went to Washington and had an interview with him on the 8th of March. I found him just as much interested as at Canton. He introduced me to his new Secretary of Agriculture, Mr. Wilson, and told him to do all he could in the matter. Mr. Wilson sent seven hundred pounds of sugar beet seed to the State.

I distributed this seed to six thousand persons throughout the State. A great many samples of the beets were sent to Washington for analysis, and at the right time a bulletin will be issued giving the analysis and other valuable information. They can then see what we can do. I believe that twelve per cent is the lowest that can be profitably worked. Some of the samples may not go as high as twelve per cent, but others go far beyond that; some as high as seventeen per cent of sugar. In some localities it can be made a success. I am more than ever convinced that we can produce sugar in Missouri as well as they can in Germany. Our land is only one fifth as valuable in money as theirs, yet there they make it a success. We have the soil, the climate, the people, everything but the information. I venture to

say that a majority of the people of this country do not know that sugar can be made from beets that can be grown right on their own farms. If we can add this to the industries of the State, it will be a big addition to the resources of the farm.

All this has been done without the expense of a cent to this Society. Every county has had samples, some as high as sixty-five in one county. In connection with this work of the Department of Agriculture, our State Experiment Station is doing good work along this line. They will do better work in the near future.

QUESTIONS AND SUGGESTIONS.

We often hear a question asked or a suggestion made that seems quite simple at first thought, but when followed up and properly answered or acted on, may mean a great deal and benefit some one or many, largely.

There are some questions that are being asked quite often recently, such as, will it pay me to start in the fruit business now? Will it pay to plant an orchard in Missouri? Would you advise planting small fruit on a large scale at a certain point? Will it pay to plant peaches on a large scale in the Ozarks? Do you think the fruit business will be overdone? And many others of a similar nature. But the most important one, and one that is the key to the entire situation is, how can we bring about a better distribution of the products of our fruit farms? When we have succeeded in placing these products where they are wanted, we have solved the problems and answered all the above questions. Can we do it? Yes.

I just had a letter from a gentleman in one of the western states east of the Rockies, who said he went into the fruit-growing business on the Pacific coast in the earlier days, and when his fruits were ready to ship, he could find no market that would pay him to ship to; so said he, I got out the best I could, just walked out. His natural desire to grow fruit leads him now to want to come to Missouri to make a fruit farm.

Compare the condition on the Pacific coast then and now, and we find that then there was no system while they could grow fine fruits; each one thought himself smarter than the other fellow and sought what he thought the best market. The result in most cases was, they all sent to the same market, and the market was like the old nigger's bank, "done broke long ago, sir," and many a fruit-grower who was a success at growing was compelled to walk out of the business. Many of them,

however, who were able financially, held on to the business, because at that time there was nothing else to go to. The gold fever had subsided, cattle and sheep had exhausted the pastures, and wheat had ceased to be a paying crop. Here this same question stared them in the face, and necessity, the mother of invention came, to the rescue.

They said we must understand each other better, "we must grow our fruit better," "we must learn how to handle it better," "grade it better," "pack it better," and we must appeal to the transportation companies for quicker, surer and cheaper rates to the market. One man or woman could not do all this alone. It was necessary that all should take a hand, and all were willing because they had come to see the necessity that something must be done. They realized that their climate, soil and other conditions were most favorable for the production of fruit, and that was about all the thing they could do at that time that would return them any profit. The final result was a thorough organization and cooperation, and now hundreds and thousands of cars of fruits are sent from the Pacific coast to all parts of the United States and to many foreign countries.

Now, allow me to ask another question and suggest an answer: Where are we fruit-growers of Missouri and the other middle-western states? We are just at that point on the road to success or failure, where the fruit-growers of the Pacific coast were when the mother of invention came to their rescue. We have come to the place where the road forks, the one is dim, crooked and full of obstructions, the other is broad, straight and smooth; the one may lead us to success, but the other will take us straight to failure. It will require much effort on our part to follow the one, but to go the other will be easy sailing.

What the people of the Pacific coast have done was not accomplished in a day or a year, nor without many sad failures and discouragements, but it has taken long years of work and worry, and meeting and discussing, and planning and resolving, and that by some of the brightest minds, and yet they do not claim that their system is perfect, but so much so that their business is fairly remunerative. Their products are known in most of the markets of the world and are always in good demand at fair prices.

Now, I do not claim that we can do just as they have done, nor do I wish to discourage any of our Missouri fruit-growers. I have said that organization and co-operation gave them success. May it not do the same for us if we go rightly at it? We have tried and failed. Did they not do the same many times? It is true, conditions and surroundings are not the same, but it is true also that we have many advantages over them. In the first place we are at least four days nearer the

markets of the world than they are. Our leading product, apples, the money maker, is more staple and is not effected in any market by any quantity of their products. I am not urging the members of this Society or the fruit-growers of Missouri to any definite line of action, but offer these suggestions to set them thinking. It is certainly well known to every commercial fruit-grower in Missouri after the last year's experience that we are more or less at the mercy of the transportation companies, commission men, brokers and so on, and that a change in the condition of things would be very welcome. Let us think about it.

J. C. ENANS, Harlem, Mo.

DISCUSSION.

Mr. Nelson spoke of the importance of the railroads in building up the country.

J. C. Evans—Some of the railroads are all right. We are getting terms with our railroads, and I suppose Mr. Nelson is doing the same thing. Some of them are willing to do what is right, but when we get across the Mississippi river, I say we are at the mercy of the railroads. For instance, \$500 freight for a car-load of peaches to Boston! Where are the profits? You had almost as well dump them. We are at the mercy of the brokers, commission men and everybody else who wants peaches. Missouri and her borders was about the only place where peaches were to be had the past season, and every man came to make something. One man actually stole a car-load of peaches and got away with them.

Question—Did the Osark Association do any good?

Mr. Evans—I can't say that they did. They were not sufficiently organized.

C. C. Bell—I suggest that a guardian be appointed for the man who lost that car load of peaches. We are sometimes to blame ourselves that we do not get the treatment from the railroads, commission men and others, that we think we ought to have. When I began to ship I charged every little mishap to the railroads. If you can show the railroad men that you have or can make business for them, they will generally meet you half way and get that business, and so would you if you were in their shoes. There are always two sides to a thing. Let us be candid and fair in the matter. Millions of apples would have rotted in the State had it not been for men like Mr. Nelson and myself, who bought them and often shipped at a loss, but I do not complain. We have to take the chances of the business in which we are engaged.

I believe everybody ought to know his business and learn it well. I believe the man who makes himself a jack at all trades will fail and come up here and howl. You don't make one tree grow all kinds of fruits.

Mr. Dubois—Southern Illinois is, perhaps, better organized than any other part of the West. Every point has a local organization, and these local organizations are combined into a general organization. When you are properly organized, you will be successful in your shipments. In regard to commission men, there is no other paper which has drawn the line on them as closely as I have done in the Fruit Growers' Journal. When I learn of one who has wronged a shipper, I publish him. They have sued me, but I beat them. I will not advertise for a house that I do not believe is honest. There is just as much trickery among fruit-growers, packers and shippers as there is among commission men.

Sam. Miller—I propose the name of Dr. Dubois of the Fruit Growers' Journal as an honorary member of this Society. Carried unanimously.

Mr. Dubois—This is very unexpected to me—at least it was unexpected until I suggested to Judge Miller that he offer my name as an honorary member. I have noticed that something good always comes to the Society which makes me an honorary member.

J. C. Evans—In response to Mr. Bell, I said that we are at the mercy of the transportation companies. Where they have done a certain thing they succeed in getting some consideration from those companies. The people of Missouri will be at the mercy of the transportation companies until they do just what the people of the Pacific coast have done. What we want is thorough organization and co-operation, and then we will not be at the mercy of those corporations. We have studied, planned and worked for years to grow fruit, and now we have got it; we don't know what to do with it.

A YEAR'S WORK ON A FRUIT AND VEGETABLE FARM.

Mr. President, Ladies and Gentlemen—To do this subject justice and go into details would make volumes. Thus we shall not attempt to discuss how to grow, handle and market the various crops. There are few pursuits of life that require more constant work, care, attention and planning than market gardening, combined with fruit-growing, to make it a success; and unless one has a liking for it our advice is

not to embark in it. Though the work is never ceasing, it is not so hard and much more pleasant than in many other occupations, as each day, week and month brings us in touch with something new in the wonderful works of nature; and thus the work never becomes monotonous. It also differs from general farming where one or two crops are depended on to supply the ready cash, for the market gardner has something to market the year around.

He should always have his "thinking cap" on, as the planting, cultivating, succession, harvesting, marketing and rotation of crops must be well studied. He must be honest and straightforward in all his dealings, and last, but not least, he must secure and haul all the manure he can, the more the better, including the use of some of the commercial fertilizers.

We will now mention some of the various products we should have to market during the year, and some of the numerous things to be done during each month. The time of operations, etc., changing as to location north or south.

Let us begin with the present month, December, having our strawberries mulched and everything in snug shape for winter, we will attend the meeting of the Missouri State Horticultural Society and add something to the stock of knowledge. We should have to market this month celery, lettuce, parsley, cabbage, salsify, parsnips, turnips, beets, carrots, soup-bunches, Irish and sweet potatoes, onions, etc.; also apples, unless they were at picking time.

If all the manure was not hauled, spread and plowed under before the ground froze, it must be finished and the plowing done the first thaw-out.

Hot-beds need attention, a few added; a succession of lettuce plants coming on, those in hot-beds and cold frames need good covering during severe cold weather. The green-house, if you have one, needs daily attention, and by the way it is almost indispensable, as it is just the place to prepare and pack vegetables and do the transplanting into flats during bad weather. What we said about December will also apply to January and February. In addition, blackberries, raspberries, gooseberries, currants and grapevines can be trimmed during warm days, cuttings made and fruit trees pruned, if you believe in winter pruning.

There are a few hot-beds to be added during January, and by the latter part of February, as many more made and planted as can be taken care of during zero nights, but no more. Early cabbage and cauliflower must be started. Out-door gardening can often be done during the last days of February, and early peas, beets, spinach, kale

onion seed and sets, lettuce, radish can be planted. If this can not be done in February, the first chance in March must be utilized.

Cold frames must be started by the first of March, the hot-beds should all be made and planted by the 15th to 20th, and those that are cleared of the first crop overhauled and planted to a second. Potatoes must be planted for early crop. Rubbish removed from the orchards and berry patches, vineyard, etc., so cultivation can commence early. The hot-beds will need a great deal of attention as the weather gets warmer, and watering, airing, thinning and transplanting must be closely looked after. A succession of the different plants and vegetables must be attended to and kept up, tomato, egg-plant, peppers, etc., started, celery, salsify and parsnip sown outdoors. The remaining winter vegetables cleaned up and sold as there will be little demand for them during April.

The latter is one of the busiest months. The strawberries must have the mulch removed, berry and vegetable plants dug and sold, new plantings made, replanting of trees and vines, the continuation preparing ground, seeding, cultivating, transplanting, etc., must be pushed, cabbage and cauliflower transplanted to the open ground, more cold frames added. Hot-beds, as they become empty, overhauled and sown or planted to 2nd and 3rd crop. Sweet potatoes bedded. Vegetables grown under glass and early vegetable plants are being marketed with increased sales, asparagus and rhubarb will be coming in by the latter part of the month as well as other outdoor grown. Spinach, kale, lettuce, onions, radishes, etc., by the first of May. Spraying the fruit trees and vines with Bordeaux mixture must be done before the buds open, cultivation begun and kept up. During May the marketing of early truck continues, adding early cabbage, cauliflower, kohlrabi, beets, peas and early potatoes by the latter part of month.

The vegetable plant trade must not be neglected and a succession kept up. Tomatoes and sweet potatoes planted to open ground. Melons, cucumbers, butter beans, string beans, corn, etc., planted with succession, plantings to follow at intervals. Currants and gooseberries will be ready for market before the month is gone. Boxes and crates must be on hand. Summer pruning of trees and vines must be done, also spraying the trees with a wash made of soft soap, lime and carbolic acid (a second application first of August). June will keep us busy with the strawberries, cherries and raspberries to market, in addition to the vegetables, of which there are early cabbage, potatoes, cauliflower, peas, beans, beets, lettuce, radish, onions, etc. Cultivation must be continued, and no weeds allowed to get a start. A succession of cabbage must be coming on, and the main crop planted. Celery

may be planted by the latter part of the month. The old strawberry beds manured and plowed under, and later planted to cabbage, celery, beans, cucumbers, corn, etc. Beds that have borne the first crop must be put in shape and cultivated. Grapes need a second and third spraying, and summer pruning must be done. The blackberries ripen by July 1, then follow apricots, early apples and plums, and in vegetables we have corn, tomatoes and butter beans to add to the list. The celery crop must be planted, also late cabbage for winter use. Turnips sown by the 25th to 30th. The refuse and wormy fruit picked up clean and fed to the hogs until the close of the season.

In August there is little planting to do, some lettuce and radishes sown for early fall use, also spinach and winter radish. The onion crop and sets must be harvested. Sweet potatoes and egg plant and melons are ready to market, with apples, peaches and plums in the fruit line.

Hot-bed pits need cleaning out, sashes repaired and painted, and the growing crops closely cultivated, which we need no more by the middle of September. Apples marketed and used up by being made into cider and vinegar, or evaporated as they ripen. Pears and peaches are to market and the grape crop must be disposed of. Potatoes are to be dug unless already done. Sweet potatoes must be dug and stored away before heavy frost falls. By first of October, there will be a demand for pickled goods, such as mangoes, horseradish, cauliflower, green tomatoes, cucumbers, fresh and out of brine, cabbage, onions, etc. Kraut to make, celery to handle and bank, a few hot-beds to be started. The apple crop sold or stored. The celery crop must be housed before heavy freezing. November is the time for cleaning up and get ready for winter. All fall vegetables must be taken care of and put in shape so they can be gotten at any time during the winter. Hot-beds made and taken care of.

The asparagus and rhubarb need a good dressing of manure, and forked or plowed under. Manure hauled to the fields and plowed under. The rubbish cleaned away from the fruit trees to keep the mice and rabbits away.

Fuel supply laid in. The tools all taken care of and repaired. The ice-house cleaned out and ready for the first crop of ice; and if we are anxious for more work than suggested here, it can always be found on a fruit and vegetable farm at all times of the year.

HENRY SCHNELL, Glasgow, Mo.

DISCUSSION.

C. M. Williams—I indorse every word Mr. Schnell has said. I am a market gardener myself and I know that Mr. Schnell is a good one.

W. M. Bomberger, Iowa—The paper suggests a mixed industry, when all Missouri is talking one apple and one or two kinds of peaches. I think we are all making mistakes. If I had to plant 160 acres of apples I would not plant all Ben Davis. I have twenty acres of vineyard, twenty acres of berries and ten acres of plums. In Missouri I would want some peaches as well as some Ben Davis apples. Fruit-growing for profit don't depend on shipping. Study your home market. This year I sold about 500 bushels of berries in my local market. Next year I will sell 1,000 bushels, but I don't depend upon the railroads. I send out my berries in wagons as far as thirty miles sometimes. When they know my berries are coming they don't buy shipped berries.

Mr. Dubois—I have official information of the fact that the apple which Eve gave to Adam was a Ben Davis, hence the fall of man.

Mr. Chandler—Mr. Bomberger says there is money in grapes at 2 cents per pound. We got much less than 2 cents for grapes sent to Kansas City. Every thing was there on the market. It was first dumped on the market and then dumped into the river. We should develop our home market.

Mr. Reed, Wis.—There is considerable interest in horticulture in Wisconsin, but more in market gardening than in fruit-growing. This is the result of our cold climate. I represent one of the best agricultural and horticultural papers in the country—the Farmers' Review of Chicago.

Mr. Dubois—The Farmers' Review is a supplement to the Fruit-Growers' Journal.

Mr. Schnell—I have been bothered very little with borers. When we wash the trees about the the first of May and the first of August, we are careful to remove any that may be in the trees. We seldom lose a tree. The wash keeps the bark of the trees nice and clean. People ask me what I do to my trees to make them so nice and fresh. It is the wash that does it.

Mr. Fell—It is very important to keep grass and weeds from the base of the tree; they harbor insects and mice.

Prof. Whitten—If tree washes are made with one-fifth skim milk to four-fifths water, they will stick to the tree much longer. I think the white color will keep the heat from the trunk of the tree. I recom-

mend a wash made of two pounds copper sulphate, one spoonful carbolic acid to each bucketful; add enough lime to make a thick wash. This is applied with a brush.

REPORT OF AWARDING COMMITTEE ON FRUITS.

MOBERLY, Mo., December 9, 1897.

Your Committee would respectfully submit the following report on premiums awarded according to the rules and instructions given by Secretary Goodman:

Lot No. 1—N. F. Murray, Oregon.....	75
“ 2—A. S. Feld, Marshall.....	\$1 25
“ 3—A. Branson, New Sharon, Ia.....	2 00

We wish to make special mention of this exhibit, which consisted of 20 seedling varieties; some of this sum very promising.

Lot No. 4—L. A. Goodman, Westport.....	\$3 75
“ 5—A. K. Dorsey, Moberly.....	3 00
“ 6—G. N. Ratliff, Moberly.....	2 00
“ 7—J. Lynn, Moberly.....	40
“ 8—S. F. Mason, Moberly.....	2 20
“ 9—J. P. Sinnrock, Moberly.....	1 60
“ 10—L. A. Cunningham, Moberly.....	75
“ 11—Geo. Gutchkunst, Moberly.....	80
“ 12—W. H. Westfall, Moberly.....	1 20
“ 13—M. Y. Buchanan, Moberly.....	75
“ 14—G. M. Dulaney, Moberly.....	25
“ 15—J. W. Dorsey, Moberly.....	3 60
“ 16—Jas. Jolly, Middle Grove.....	1 80
“ 17—G. B. Skinner, Cairo.....	3 00
“ 18—J. McMahon, Moberly.....	2 00
“ 19—D. A. Robnett, Columbia.....	4 00
“ 20—R. E. Bailey, Fulton.....	3 00
“ 21—J. H. Marlon, Fulton.....	50
“ 22—Francis Kelly, Moberly.....	1 00
“ 23—P. D. Quisenburg, Moberly.....	2 50
“ 24—B. W. Halliday, Moberly.....	1 50
“ 25—P. J. Dorsey, Cairo.....	2 20
“ 26—B. R. Boucher, Cairo.....	2 20
“ 27—Robt. Mathews, Cairo.....	1 40
“ 28—A. Z. Moore, Cedar Gap.....	1 50
“ 29—C. C. Bell, Boonville.....	2 60
“ 30—Sam Sinnrock, Gorlin.....	3 00
“ 31—D. R. Blmbaker, New Lebanon.....	25
“ 32—G. H. Shepherd, Lamonte.....	3 80
“ 33—J. H. Monses, Beaman.....	2 50
“ 34—Jos. Gamble, Brookfield.....	2 50
“ 35—J. T. Snodgrass, West Plains.....	2 00
“ 37—D. B. Moore, Macon.....	75
“ 38—G. W. Lemsley, Mexico.....	2 60
“ 39—E. B. Guthrie, Moberly.....	3 20
“ 40—W. G. Gano, Parkville.....	4 50
“ 41—G. T. Odor, Holt.....	6 00
“ 42—A. Nelson, Lebanon.....	4 00
“ 43—Ed. Knight, Dixon.....	3 50
“ 44—T. L. Lewis, Cuba.....	2 50
“ 45—L. Gelger, Boonville.....	75
“ 46—C. H. Dutcher, Warrensburg.....	1 25
“ 47—Barry County Society.....	1 60
“ 48—Sam Miller, Bluffton.....	2 00

Lot No. 49—R. J. Bagby, New Haven	\$1 25
“ 50—Ark. State Society	3 00
“ 51—R. F. Ralson, Calro	25
“ 52—D. G. Day, Calro	50
“ 53—J. C. Evans, Calro	50

We find an exhibit of potatoes from Wisconsin consisting of 98 plates—30 seedlings of this season, 14 seedlings of last season. Among the most promising varieties we find the following, which seem to be worthy of trial in Missouri:

Mills Prize, Great Bird, Enormous, Rural New Yorker No. 2, Wilson, first choice; for early, Early Michigan; Read's Early Pinkeye, Maule's Early Thoroughbred.

We would recommend the payment of \$10 as a premium on this potato exhibit, payable to L. H. Read, Grand Rapids, Wis.

J. W. STANTON, Illinois, Chairman.

Report adopted.

THE KEIFFER AND OTHER VARIETIES OF PEARS.

The popularity of the Keiffer is owing mainly to its ease of transplanting, quickness of growth, prolific and early bearing, but it is not altogether free from blight, as was claimed for it. Being of the rankest growth, the more care should be exercised to plant the trees in situations where this can be prevented.

The place to plant the Garber, and in fact, all other varieties of pear trees, would be on well-drained sites. Small crops can be grown among the trees, especially such as will mature in the fore part of the season; when not planted to any crop a shallow plowing should be given in May. A week or ten days after the ground may be harrowed, and later the weeds and grass may be cut with the mower, which will answer for mulch.

It has been our practice always to head the pear very low; the Garber and Keiffer require this more than others; the rampant growth and extreme brittleness of wood will not sustain the weight of fruit.

The Duchess needs much pruning, as also the Clairgeau, which needs the sun to perfect and color its fruit.

Thinning is of the greatest importance; the imperfect fruit should be removed from the tree.

The varieties we should plant are Clapp's Favorite, Bartlett, Duchess, D'Anjou, Flemish Beauty, Howell, Winter Nelis, Clairgeau, Keiffer, Bonne Louise de Jersey, for commercial use; for home use, would add Doyenne d'Ete, Rosteejer, Tyson and Seckel.

J. A. DUKES, Weston, Mo.

PEAR CULTURE.

There is an opening for the intelligent pear culturist in many parts of the United States. There is not a one hundredth part as many pear trees growing in this country as there are apples. Little attention has

been given to pear growing. For these reasons and for others, the man who makes a special study of pear culture, and who goes into pear growing intelligently and judiciously has a good opportunity for success.

Pears can be grown nearly as cheaply per barrel as apples, and they usually sell nearly twice as high. Growers who have succeeded with apple orchards may not succeed so easily with pear orchards because they have not given the pear culture the same attention, but where the same attention is given, and the same knowledge secured, the necessities of the pear, the selection of varieties, the location and soil closely studied, there is no doubt that pear growing will be much more profitable.

SOIL FOR PEARS.

Clay soil is considered best for pear culture, and still it should not be too tenacious and sticky. A pear orchard will not thrive so well on any soil that has not a clay subsoil. Next to a friable clay loam, a gravel loam is most desirable. A light sandy soil is the least desirable of any, and yet pears can be grown on sandy soil.

Standard pears can be planted twenty to thirty feet apart according to circumstances and habits of growth. If planted thirty feet apart, dwarf pears can be planted between the rows each way. I prefer a standard pear for general orchard culture, for the reason that they require less fertility and cultivation, and for the further reason that they are longer lived and make larger and more permanent trees.

When the question came up for a vote, however, before the Western New York Horticultural Society, we found that the dwarf pear was the favorite for orchard planting or for garden. Dwarf pears have the advantage of coming into earlier bearing. The dwarf pear is not short lived. It requires more pruning and more attention than the standard pear. Many varieties do better on the dwarf pear than on the standard.

I should not locate a pear orchard or any other orchard on a low piece of ground. I should locate it on a hillside. The pear is easily transplanted. I transplant several thousand every spring, and they do not lose, on an average, one out of one hundred trees. Pear trees come into bearing earlier than the apple.

MARKETING PEARS.

"In what packages do you market yours?"

"I always use a bushel keg, which costs 15 cents each. I sort my fruit into first, second and culls. The culls I sell from the wagon in the local market, at from 25 cents to 50 cents per bushel. The culls

comprise all the wormy fruit, the knotty specimens, the small and the bruised. I allow no wormy or knotty fruit to go into the first or second grades."

COLD STORAGE.

"What has been your success in keeping pears in cold storage?"

"I have kept Bartlett's four weeks in a room kept cold with ice. It was profitable to do so, but it would not have paid to have kept them there longer. I rented a cold storage house for this purpose. I did not have pears enough to fill the cold room, therefore it cost me 50 cents per keg to store them there for one month. Had I been able to fill the cold room completely, it would not have cost me over 15 cents. The Bartlett's went to market after being removed from the cold room in splendid condition. If I had sold as soon as picked, I should have accepted 60 cents a bushel, whereas I received \$2.25, after having stored them a month. Another year's experience might not have resulted so profitably."

DISCUSSION ON PEARS.

Polster Bros., Wright City, Mo.—We planted a pear orchard which consisted of about 1,200 trees; about 900 were Keiffer, the balance were part Garber, Bartlett, Duchess, Howell, Clapp's Favorite, Flemish Beauty, Smith's Hybrid, Lawson, Le Conte, Sheldon, etc., etc. The trees all did well the first year and second year. The third year some blighted, but not of Keiffer nor Garber, and Keiffer were replaced where others died, and Keiffer bore in three years from planting out a fair crop. Other varieties kept dying, and we kept replacing with Keiffer, until we now have nearly all Keiffer in orchard. In 1896 other varieties blighted so bad that we got discouraged with them. So we used the ax, cut them off and grubbed them out, even trees that were not so bad effected, and replaced with Keiffer. Think if we never would have planted anything but Keiffer and Garber we would have never had any blight on our place. We are now losing some every year, even of Keiffer.

Our first orchard was planted out in 1887; three years ago we gathered 1,500, two years ago 700, and last year 500 bushels. Only about one-half of trees bore last year; the fruit was good, but drouth effected it some this last year.

We think the Keiffer pear is among pears what the Ben Davis is among apples, but it is thought the quality of the Keiffer is much better on some soils than on others, and then they must be picked at the right time and ripened in the right temperature to bring them to perfection that is nearly equal to Bartlett in flavor. We last year wrapped

several hundred bushels and put up in 40-pound boxes, and they sold for the same as California pears brought in St. Louis market. We regard the Garber next to Keiffer.

N. F. Murray—The Keiffer comes in later than the Bartlett and other pears, and does not have to compete with them. If kept till ripe, it is fine for all culinary purposes and fairly good for eating. It is the most money-making pear we have. A friend sold \$400 worth from 27 trees on one-half acre of ground. It is a fine ornamental and shade tree also. I think it better than shade trees that bear only leaves.

Secretary Dunlap of Ill.—Personally I have not had very much experience with the Keiffer pear. When I planted my small pear orchard I was afraid to plant the Keiffer, as so much had been said against its quality. I am now very much pleased with it; it is a good bearer; it comes when pears are scarce; it is of very much better quality than I had supposed. I have tasted them and they are equal to any California pear I ever tasted. I have never known the Keiffer to blight on my place, but I know instances where it has blighted. It is much less subject to blight than other varieties. The Garber has blighted some. It is fine looking and earlier than Keiffer; but I am not as favorably impressed with it as with the Keiffer.

Mr. Stanton—I have an orchard of 2,000 pear trees. I undertook to keep that number alive, but I find it a big contract. They are now cut all to pieces with the San Jose scale. In my vicinity we had no blight on the Keiffer the past season. Mine have not blighted, but others have. I think one notable feature of the blight is that it was nearly always found on flat, close, compact land, such as post oak flats and marl clays. Where water is allowed to stand and evaporate, I don't believe a pear tree will grow. I want to add a word of warning to parties who are growing Keiffer pears. It will set too many fruits, and if you don't thin them you will not have good fruit. They will set twice too many; they will have no flavor. It will become of bad repute in the market. A Keiffer must be picked before it is ripe if you would have it of good quality.

Mr. Langston said he had 800 pear trees on low land with gravelly sub-soil, well drained; they had never blighted.

Mr. Stanton—The Keiffer stands well till it gets six or seven years old.

Mr. Culp—I have a pear orchard of 15 acres ranging from high land to flat gumbo. I have no blight even on my older Keiffer trees. LeConte dies, Bartlett dies. The Keiffer this year was full of fine-sized, highly colored, beautiful fruit. They will stay on the tree till Novem-

ber. When left on late it makes a better pear than when picked early. They need some thinning, but if the trees are well pruned they hold up in size. I cut back very much—one-half or two-thirds of the previous season's growth. I don't cultivate at all.

Mr. Murray—I have seen Keiffer blight on high land well drained. Where I cut scions I had blight and there only. I would not let a man cut my pears back.

Sam Miller—I generally cut back some in the top. I thin my Keiffers when half-grown and again later. Then I pick the fruit at the proper time. Even the thinnings become fit to cook. An overloaded Keiffer produces fruit not fit to eat.

HORTICULTURE IN SCHOOLS.

The man who plants an orchard should not be discouraged as long as the trees make a steady growth. The same principle is true of any undertaking in life. It is when the blight kills the trees; it is when insects or frosts destroy the fruits; it is when wicked and designing men scheme to destroy the virtue of unselfish plans in life that we lose hope and murmur.

The cause of shaping horticultural knowledge so as to fit it for the school-rooms of Missouri may today look like a tender plant, but it has roots deep and strong, and they are imbedded in the fertile soil. This idea is dear to the true, and the brave, and the honest. Here every patriotic son and daughter of Missouri will be sure to find an object worthy of love; a movement fraught with far-reaching results; a study that enlarges and ennobles as you pursue it until it draws you into sympathy with the future prosperity of the rising generation and the material advancement of the State.

To place the study of horticulture in an attractive and tangible form so that it can be studied by our youth and consequently leave the desired impression on the minds of the future generations is an undertaking that has no place for the selfish, greedy elements that are so characteristic of this age.

We know it takes time, money and hard work to awaken and engage the thought of a great people on any subject; but there is no want of any of these on the part of the friends of this movement.

The lists of questions on horticulture sent out annually to our fruit-growers, scientists and school teachers, and the answers received from them are indicative of the sympathy they have in this movement. We have no fears but that we can reach the understanding and win the

respect of the well-meaning people of this State. The difficulty we anticipate is the one we encounter in every measure of this kind. It is that the voice of the people will not be heard. I shall never forget the difficulty we had in getting our pure butter bill incorporated into the laws of the State.

So, I am afraid, if the demand be made that a hand-book on horticultural knowledge be taught in such public schools of this State as desire it, the wish of the people will be denied or granted just as the design of the politician is served. I hope I shall be mistaken in this. How expensive it is to establish a Horticultural Department in the State University before it is allowed in the primary departments of the State schools. Not one can attend it there where 1,000 should attend it here. But amid all these irregularities, I entertain the hope when the time comes, as it soon will come, when horticulture and similar studies will seek to displace ancient geography, mythology, the dead languages and dead faiths of the dead past, the door will be ajar and our boys and girls will be allowed to study by the light of nature's sunshine that which will aid them in raising the fruit foods of the people and beautifying the homes of the future. As I travel over this State and see the expensive mistakes made in fruit-growing by even those who can read Latin and apply geometry, as I see the want of horticultural knowledge in the illy ornamented homes and public grounds, as I think of my own mistakes caused by my inadequate information at the time I set out my fruit and laid off my grounds, I am persuaded to toil by night and by day to push the work of collecting the necessary facts and dressing them in an attractive style for the school children of our State. This subject needs your thought and friendship. It is the best work you ever undertook.

How very different from one who does not know, will a man or woman who is familiar with the best varieties of trees, flowers and fruits, who knows about the best locations and modes of cultivation, who is acquainted with the terms used in horticulture and floriculture, who can point out the fungus growths and injurious insects—I say, how different will he go about developing the orchard resources of his State or beautifying his own grounds.

What a lost world the whole subject of horticulture is to a soul that knows nothing of it. What a source of constant blessing it is to him who seeks among its hidden beauties and intelligently holds converse with the charming life and beauty with which nature has clothed the plant and flower and fruit.

If a book treating upon these things is illustrated with the fine cuts used by the artists of today, the whole subject will be charmingly

attractive to the eye as well as to the understanding of both pupil and teacher. There can be no book written on all the varied subjects that man must master that can be compared in beauty or usefulness to it. Nature's studies are the child's delightful studies and none approach or combine the beautiful and useful quite so closely as does the study of horticulture. Today this Society is taking the initiatory steps to collect, define, illustrate, classify and arrange for the school-room those facts that every truly educated son and daughter of Missouri must know.

Our education always has been and always will be sadly neglected without this knowledge. No man should ever be entrusted to map out the future of Missouri without it. Oh, that we might live in the sunshine of true knowledge and plan for the future not dwell in the past. Oh, that our teachers would teach the needs of the age in which we live, instead of turning out boys and girls into the world who know so little of the real life and heart of everything about them.

Our school-rooms should be in touch with the living present instead of lingering in the cemeteries of the dead theories of unscientific ages. How very unfit our boys and girls are to possess the fields for horticulture when they leave our schools. How little they know. How failure will strew their pathway with disappointment, wreck and ruin. They will censure, they will heap reproaches upon the State that fails to educate them. They do it because disappointment and despair follow their efforts. I would not say it if I did not know it. If there is any virtue in us who see these conditions, we will lay the foundation on solid rock. The rock is education. Our duty is plain. As long as we live let us labor to bring about that freedom which education alone can give to those into whose hands we will soon entrust the destinies of the grandest State in the Union.

WHAT HAS BEEN DONE.

Seven years ago the members of this Society were confronted with the fact that there was no practical common school text-book on horticulture that the student could study.

We have undertaken the task of preparing such a book. Our plan is to show conclusively to the people the need of such a study; to awaken enthusiasm in its favor among ourselves, the teachers and public spirited men, and at the same time to collect such knowledge as is adequate to the needs of the present time. For the last four years we have sent out a new list of 100 questions on horticulture to be answered by those experts who know best the answers. As their information is received it is published in our annual reports, and finally

the whole will be rearranged and classified for use in public schools, and then we will seek for desired legislation to allow its use.

We have every assurance that Iowa, Illinois, Kansas and Ohio will join us this year by appointing similar committees in their several State societies on horticultural education to co-operate with us. Thus we hope the work will enlarge and develop until it is consummated in the desired result.

Last winter we acquainted the school teachers of this State with the year's work when they met in their State convention at Sedalia. We hope to do the same this year at Jefferson City. We ask the co-operation of all friends of this movement in all education.

G. B. LAMM, Sedalia.

DISCUSSION.

Prof. Whitten—This Society is doing a good work in pushing horticultural work along in the schools. This year the demand for instruction in horticulture at the University was larger than ever before. There were thirty teachers in our summer course. Thirteen of these took the course in horticulture. The result was that at the end of the short six-week course they were very much enthused over the work. So far as known, no other institution in the United States of America has offered any such course. Naturally the teachers who attend this summer course demand instruction in the branches which are required in the common schools. Horticulture is not required; yet the University took it up and pushed it. This shows that the University is anxious to meet the demand of the people of the State. I think Mr. Lamm will believe that the University is willing to co-operate with the horticulturists in teaching this subject in the public schools.

Sec. Goodman—Twenty-five years ago we began the agitation of teaching horticulture in the schools. We are making progress. We will get all these things in the proper time and way. We do not expect it to displace dead languages and sciences. Horticulture in the schools must come as a growth, or it cannot come at all. Our State Superintendent has recognized three books on horticulture as text-books in the schools. It is not necessary to teach horticulture without regard to other things. It is hard to teach things that nobody wants to learn. When I went to Columbia to teach horticulture, I said, "Boys do you want to know something about horticulture? If you do, I will be glad to help you; but if you do not, I do not care to teach you." When children get older and want to know anything of importance in a business way, they will learn as much in six weeks as they would have

done in six years when small. There is nothing in the world which expands a man as much as getting knowledge of everything he can. You need never be afraid of learning too much of anything. The country is full of knowledge, and you can have just as much as you are willing to take. The world is full of the goodness of God; you can have just as much as you are willing to take.

Let us follow the plan of the paper and have horticulture in our schools, but let us not forget that we should not neglect the greater studies and the greater development in our University while we are caring for the lesser.

Again, the best way to get horticulture in our schools is to teach it in our colleges and universities—prepare our teachers for this work and they will gladly take it up. It is only teaching nature in an improved way, and our teachers ought to be ready to teach it as soon as they become acquainted with its needs. I believe horticulture should be taught in our schools, but not from a text-book. It should be taught by talking and telling about the trees and vines, and fruits, and vegetables, and by illustration, and experimenting, and testing, and examining common things about us; learn of them and from them. Show them seed and how to plant them; show them twigs and how they bud; show them trees, and vines, and plants and plant them, and see them grow. All this should be done, should it not, without bringing down to book-form this knowledge? Make it a study of nature in horticulture, or rather horticulture in nature.

Mr. Murray—I want to say a few words endorsing the paper and what friend Goodman has said, and a word in regard to the prospects of getting horticulture in our schools. This matter was before the Thirty-ninth General Assembly. As chairman of the Committee on Agriculture, I think we could have passed anything along this line if we had been prepared for it, but we had no work ready for instruction along the line of horticulture, so we thought best to wait till a work could be formulated. I don't doubt that we can get the law when we are ready for it. We wonder why our sons don't attend the school of horticulture. You can't get them to take it till they want it.

PEACHES FOR CENTRAL MISSOURI.

Below I give you a list of peaches that succeed best with us: Early Rivers, Mountain Rose, Early York, Old Mixon Free, Old Mixon Cling, Smock, Stump, Elberta, Crawford's Late, Henrietta, Piquett's Late, Salway.

Heath Oling, a few years back, was one of the most profitable peaches grown with us, but of late years it seems to have been attacked by some disease, the fruit in many instances being completely covered with gum, making it utterly worthless, and I notice other clings are affected in like manner.

The peach yellows and San Jose scale are both with us and I fear if there are not laws enacted by our State Legislature that they will spread to every portion of our State. I have only had, so far, three or four peach trees affected with the yellows, and these I cut down and burnt as soon as I discovered they were affected, but there is scarcely a peach orchard for miles around that is not more or less affected with the disease. Mr. L. V. Dix's orchard is the only one, so far, in which the San Jose scale has been discovered.

About 90 per cent of the strawberries and blackcap raspberries succumbed to the drouth. Blackberries and red raspberries were but little damaged. Fruit trees that were well cultivated were not seriously damaged by the drouth, and the prospects for a good crop of fruit next year are good at present.

A. J. DAVIS, Jefferson City, Mo.

BEST CHERRIES, BEST LOCATION AND BEST TREATMENT.

In all fruits there are those varieties that excel in popularity and stand out pre-eminently superior to the majority of varieties of the same class on account of their hardiness, thriftiness, fruitfulness and other good qualities. For single illustrations that will be plain to all take the Ben Davis in the apple, Wild Goose in plums, Concord in grapes and Crescent in strawberries.

These varieties with a few others, some of which are far better in some respects than the ones which I have named, stand at the head of the list in their respective classes; and the man that plants them and gives them fair treatment will reap a bountiful harvest.

On the other hand there are hundreds of other varieties that will be a source of expense and disappointment to the planter. I would therefore advocate the planting of varieties that have been thoroughly tested and known to be good. Not that I wish to get into a rut and stay there, but I do not believe it is the business of the fruit-grower and farmer to engage in expensive experimental work, especially when there are other agencies better adapted to such work than he is. I believe in making use of all the experience I can get from Experiment Stations, Farmer's Institutes, agricultural papers, friends, neighbors and every other available source. Experience is too dear to be bought

direct. Even after the merits of a new variety have been thoroughly investigated, and the evidence would seem to prove that it was superior to the old varieties, it would still be unwise to at once discard the old and stock up heavily with the new. What I have said of other fruits in general, will apply to the cherry in particular.

Of the host of varieties described in the catalogues, and most of them in glowing colors, there are but a few that are worthy of a trial by the fruit-grower or farmer. Some of these varieties that I have designated as worthless may occasionally, under very favorable conditions, bear a crop of fine fruit, but as fruit-growers are generally practical business men who are striving for the highest degree of success, they cannot afford to spend time and money pampering these shy-bearing varieties. Who would think of planting the Heart and Bigarreau cherries for home use or market here in Missouri when we have such varieties as Early Richmond, Montmorency and English Morrello? And yet, strange as it may seem, in this enlightened State, flooded as it is with reliable information on all subjects pertaining to agriculture and horticulture, many of our farmers are doing this very thing or worse. They are willingly paying fancy prices for new varieties of which they, and in some cases, no one else ever heard of, simply because they are recommended by unprincipled tree dealers.

For market I would plant very sparingly outside of the three varieties already referred to. Early Richmond, or Early May, as it is often called, is unquestionably the most popular cherry in the west. It is very fruitful and, no doubt, brings growers more money than all other kinds combined. Montmorency (Ordinaire), though not as popular on account of not being so well known as Early Richmond, is as good a cherry in every respect, and in some respects superior. It is a regular and heavy bearer. Fruit somewhat larger than Richmond and ripening about ten days later. The tree is an early bearer and a fine symmetrical grower. The English Morrello is a good cherry, but ripens so late that it is rather out of the cherry season and is therefore difficult to market. It is an excellent cherry for home use, especially for canning. Late Keutish is also a fairly profitable cherry. It opens early [in July, and is therefore not as late as English Morrello. It is smaller than Early Richmond and more tart.

The soil of North Missouri is not the best for the cherry. It is too heavy and the sub-soil is too cold and compact. The cherry delights in a loose, deep, sandy soil. Failure is often due to unsuitable location. Trees are frequently planted on low or poorly-drained soils, and live for years under favorable conditions of the weather and then die suddenly

when the ground remains soaked with water for several weeks at a time. Such conditions as these prevailed in several western states some five or six years ago. Many large bearing trees suddenly turned yellow and died, and whole rows of young nursery trees were lost, and in consequence the price of cherry trees was advanced materially.

So then we should remember that the cherry, above all fruit trees, should have a dry location. The varieties that I have named as successful in this State should always be budded on Mahaleb stock as near the ground as possible. The cherry is said to be a difficult fruit to bud, and it is true that the efforts of new beginners usually result in utter failure. It is not a difficult matter to get cherry buds to take if they are inserted late in the season—not before September first—and from then on as long as the stock is growing. All stone fruits take much more readily if budded late. Indeed we are informed on the authority of the Texas experiment station that budding can be successfully performed in the winter on dormant stocks. It is done as follows: "After cutting off a bud with some wood attached, cut a slip of bark with some wood attached to it also down about one inch, leaving it still attached to the lower end. This cut must be made about the size of the cut bud so that the bud will fit evenly over the cut place. Part of the loose slips should be cut off and the bud slipped down between the wood and the slip. Tie the bud tightly with raffia or corn shuck." We have had success with this method in January. The buds soon knit firmly, and can be forced out in spring. This method can be used to advantage in dry weather when the bark refuses to slip, or on stock which failed to take when budded in the usual way during the summer. We have budded roses and many kinds of trees in this way successfully. This method greatly prolongs the season of budding and will to that extent somewhat lessen the cost of the work.

The cherry tree, after planting in the orchard, is exceedingly liable to bark burst or injury from the sun on the south and west sides of the trunk, greatly detracting from the looks and usefulness of the tree. To avoid this the trees should be made to branch out very near the ground. Two-year-old trees are generally planted, but as they are usually headed too high as they come from the nursery, and as it is difficult to start the branches lower on such large trunks, I would advise planting trees one year from the bud. If the lower branches of these have been removed by the nurseryman, others can be forced out by cutting back the main stem to 18 inches from the ground. This will give the tree branches 12 to 15 inches from the ground, and, by the way, it is a good practice to have all kinds of fruit trees branch

out quite near the ground. The cherry requires but little pruning. Keep all dead wood cut out, and all crossing or interfering branches should be removed while young. Clean, thorough cultivation should be given the young trees, but when they come into bearing it is best not to induce too much growth. The ground may be sown to clover, which should be cut two or three times during the season and allowed to remain on the ground to add nitrogen and act as a mulch. I have often noticed trees bearing successive crops of fine cherries while standing in tough sod or in hard packed door yards. I would not say, in view of this fact, that it is best to discontinue cultivation entirely when the tree comes into bearing, because I have seen other trees bear just as good crops under cultivation; and then, in the case of trees in door yards, the curculio is no doubt at a great disadvantage by the difficulty of working in the hard ground and being frequently disturbed by persons passing and by poultry. This suggests the question of spraying, which cannot be ignored if we wish to grow perfect fruit. It is questionable if the curculio can be successfully combatted by spraying. Jarring is much more reliable, and yet it is not always practicable.

The habits of the insect should be carefully studied, and efforts put forth to restrict as much as possible their increase. Chickens are very useful in destroying them, and should, therefore, be allowed the run of the orchard from early spring till the fruit is harvested. Hogs, also, are useful in helping to exterminate the insect. By their rooting under the trees, no doubt many of the insects are thrown out from their resting places and either perish from the weather or become the prey of birds. The aphid often becomes very troublesome on the cherry by sucking the life out of the tree through the leaves. They are quite easily killed by spraying with kerosene emulsion.

This whole matter of spraying is fully set forth by bulletins issued by all the states and the Department of Agriculture at Washington, and to them I would refer any one interested.

G. P. TURNER, Meadville, Mo.

THURSDAY, 2 P. M.

The meeting was called to order.

Report of Committee on Final Resolutions.

The motion of Mr. Rice that report of Committee on Resolutions be accepted was withdrawn.

Mr. Goodman moved the adoption of the report, except the part in regard to the Paris exposition. Carried.

Mr. Nelson moved the part excepted be adopted. Carried.

Your Committee on Final Resolutions submit the following report:

We desire to thank the people of Moberly for their uniform courtesies and kindness, and for their interest and attention to the proceedings. We wish to thank the ladies for the beautifully decorated hall. We especially wish to thank the professors, teachers and pupils of the public and high schools for their most excellent singing, and also the ladies for their equally excellent music. We extend the thanks of this Society to the hotels for the attentions and favors shown visiting members. We also wish to thank the railroads for the favors we are about to receive, maybe. If not, then we wish to thank our worthy Treasurer for jumping into the breach; whereas it is

Resolved, That your Committee feels that its work would be most incomplete did it not acknowledge in some way the inestimable services of our retiring President, rendered to this Society and the great fruit interests of our State.

We feel and acknowledge our inability to find words that will fitly express our appreciation, or that of the friends of horticulture everywhere. We have not only enjoyed the benefit of his precepts, but have been equally benefited by his example, the results of which may be witnessed in the magnificent horticultural monument he has reared amidst his green Ozark hills. We freely admit the truthfulness of his statement that no one in Missouri is more deserving or more capable than the one chosen as his successor, and realize that his large private interests impose a heavy burden upon him, yet we trust that he will still give us the benefit of his counsel and advice in the future as liberally as he has done in the past.

Future generations will point backward to the time when horticulture in Missouri took an onward and upward bound towards the splendid fruit development that within a score of years placed a comparatively unknown State, in so far as her fruit productive capacity was concerned, not only among the first, but actually the first fruit state in the Union.

Among all the men who may take due share of credit for this splendid result, there is no name to whom so much is due as that of the Hon. J. C. Evans, of Missouri.

Carried.

RESOLUTION.

Whereas, The World's Fair is next to be held at the city of Paris, France, in the year of 1900; and

Whereas, The general government is now arranging for space to exhibit American products, among them the agricultural and horticultural products of our land; and

Whereas, The President of the United States will soon appoint commissioners for the various departments; and

Whereas, Missouri is now among the first states in the value of her fruit products in the union; therefore, be it

Resolved, That the Missouri State Horticultural Society, in annual meeting assembled at the city of Moberly, having full confidence in his knowledge and ability as a fruit-grower and shipper, and by reason of his past experience of twenty-years as a dealer, grower and shipper both in this and to foreign countries, therefore we hereby most earnestly and respectfully petition his excellency, Wm. McKinley, President of the United States, to appoint the Hon. Chas. C. Bell of Booneville, Mo., one of the special commissioners for the United States in charge of the horticultural products placed on exhibition at said World's Fair.

Carried.

OMAHA, NEB., December 9, 1897.

L. A. Goodman, Horticultural Society, Moberly, Mo.:

Greeting from Trans-Mississippi Exposition. We expect Missouri to do her part nobly.

[F. W. TAYLOR.

GRAPE GROWING IN THE MISSOURI VALLEY.

The subject assigned is one by no means new, yet I feel unequal to the task, embracing as it does a vast amount of detail that is neither convenient nor proper to present in a short paper. Grape-growing as an occupation of man is very ancient. It has claimed a part of his time and talent through all changing scenes in the history of the human race.

The Missouri Valley possesses many favorable features that the grape demands. Of course we recognize the advantages imputed to some other localities, such as the Chatanooga Grape Belt, northern and western Texas and southern California, for the raisin grape, but to our own surroundings let me call your attention. In point of favorable location and rare adaptability of soil, I wish to emphasize the "loess" formation along the Missouri river. This is a strip of country from six to twelve miles wide, and contiguous to it for a greater portion of its length. The soil of this formation is in very many places fifty feet deep and equally good all the way down. We hear much of Klondyke, but what a fortune is here for the present and future generations!

If we except five or six counties in the southeast part of the State we think Missouri is the best all-around grape-growing section in the Union, with a maximum quantity of five tons per acre. Nor will I omit to notice my own state—the fair land of Kansas. On the maps during my early school days was printed the "Great American Desert." What a howling desolation we had pictured it in our minds' eye! The "desert" is gone, and in its stead the great commonwealth of Kansas. Its vintage may yet astonish the world and share the honors along with its wheat, its corn and its cattle.

But to be more specific in regard to grape ground, I will just say that yonder hill, with a good drainage and an eastern exposure, is an ideal location. Secure thrifty 1-year-old plants; plant in the early spring on land prepared the previous year; place the plants in rows eight feet apart; also eight feet apart in the row. Every seventh row should be eleven feet wide to facilitate driving through. Cultivate well for two years, but allow no crop the first and second years. The subsequent cultivation should be thorough, both to prevent weeds and to overcome the effects of drouth. In no case should the soil be allowed to crack; frequent and shallow cultivation is the remedy. If defoliation occurs the crop will be seriously damaged.

Pruning will now claim our attention. Without any attempt at a scientific explanation how, I will just say that three or four canes of thrifty new wood should be left for the coming crop. These canes will have from thirty to thirty-five buds, which is plenty if the vineyard is well up in fertility; if the land is thin and over-cropping has been allowed one-half this number is ample.

The time for trimming should immediately follow our Indian summer, then the leaves are off and the wood is matured; we will get well punished if pruning is left until mid-winter or early spring. Mud and snow boot top deep will be your portion with no mitigating compensation; besides you have contracted rheumatism, neuralgia or bronchitis. Another reason for pruning in the fall is that we get rid of fungi spore and insect eggs by burning all trash and accumulated debris.

The only summer pruning that we practice is to pinch off the end of the new vine beyond the second leaf just after the fruit has set. Some question its utility but we think it is beneficial. The question of what varieties to plant is not the least important to decide. The black grape is the most popular. For commercial planting three well known varieties stand at the head, namely: Moore's Early, Worden and Concord, ripening in the order named with intervals of ten days. Of the many new black grapes before the market, one in particular is worthy of mention, namely: Cambell's Early; many speak in praise of it; we think it has come to stay. Telegraph, Janesville and Wilder are very popular with some growers.

Red grapes are evidently gaining ground. The best of all is the Brighton. We have not yet seen its superior; then follow the Delaware, Lindley, Woodruff, Salem, Wyoming, Massasoit and Goethe.

White grapes have many admirors; the most fastidious tastes cannot fail to be pleased. Of the especial favorites we name Niagara, Pocklington, Moore's Diamond, Martha, Lady Washington and Missouri Riesling. We cannot pass the subject of varieties without calling attention to the new seedling and hybrids of T. V. Munson of Denison, Texas. The newer strains of Texas Post Oak, or *Vitis Lincecumii*, are worthy of the grower's careful attention. Some of them have been known to do well through a dry and hot season in the southwest when the Concord was a failure.

The Vinifera varieties belong to southern and western Texas and California; they have no place in our catalogue.

In our experience with the vine, we have not been afflicted with mildew or rot.

The Bordeaux mixture is the great remedy; apply it plentifully once before budding and twice after at intervals of two weeks. The

prophets of old have told us of the utter devastation of the vineyards more than 28 centuries since. Thankful, indeed, are we that no such scourges are recorded in our time.

A little worm classed entomologically as thrips does some damage.

That dread destroyer of the European vineyard, "phylloxera," has not visited this country to any considerable extent; but let us be watchful; neglect will only presage disaster and disappointment.

The subject of a market must be left to some one else. Besides the home grown stock many car-loads have found their way to Kansas City, but they are cheap. But be their commercial value what it will, they retain all their medicinal and delicious qualities just the same.

To the townsman we recommend the culture of the vine; the occupation will be both pleasant and healthful. Many an unsightly spot can be hid; also, it can be made to lessen the expense account. A lack of room will be urged as an apology, no doubt. So used have all of us become to the broad prairies that we cannot place a proper estimate on a foot of land.

In closing, I will say to the fruitman: Wake up, study your fruits, your climate and your soil. God may have been a million years in preparing Missouri for your habitation and mine. Let us do our own work in our own time. Some day this State will have ten millions of people, and a new generation will be singing praises to a beneficent Creator for the abundant harvests of the vine.

A. CHANDLER, Argentine, Kas.

GRAPE-GROWING.

From reading ancient histories and legends it appears that the grape culture is as old as man; yet seemingly it is the least understood hereabouts.

The intelligent grape-grower, in order to become successful, should acquaint himself with the fundamental principles of the grape vines, the home of the variety and where mostly cultivated successfully, the history of the variety and its illustrations, the general character of the vine, its vigor of growth, fertility, hardiness, resistance to heat, cold and drouth, to parasitic and fungous diseases, to insects, requirements of climate, soil and culture; its wood, heavy or light, long or short-jointed, color and character of its bud; leafing early or late, size of its foliage, shape (lobed or not), upper and lower surface (smooth, glossy, hairy or wooly); leaf fall, early or late, change of color (to yellow or red) preceding fall; size and shape of the bunch, shouldered or not,

compact or loose, size of berries, shape, skin, color pulp or flesh, number and size of seeds; their consistency, taste and use, for table or wine, or for both; keeping quality, period of blooming and ripening (early, medium or late).

Furthermore, in order to enable him to thoroughly understand the special characteristics of the vines by their nativity, he should acquaint himself with the classification of native wild grape vines and their botanical characteristics and names.

After the settlement of the New England states the *Vitis Vinifera* (the European and Asiatic grape) was introduced and planted, and, after thousands of failures (on account of the destructive *Phylloxera*, grape-vine root-louse, of which at that time nothing was known) observing the native wild grapes growing vigorously and bearing their fruits yearly, the growers commenced to improve them. Hence the grape-vines we cultivate in the United States east of the Rocky Mountains have originated from one or the other of the several distinct native species or from crosses between some of their varieties.

These native vines are distinctly different from each other, growing wild in certain limited portions of our country and not at all in others.

For example the *Labrusca* (the Northern fox grape), whose home is the region between the Atlantic ocean and the Alleghany mountains, is a stranger in the lower Mississippi valley and westward.

The home of the *Æstivalis* (the well known summer grape), is the grape of the Middle and Southern states; it is one of most variable of our grape-vines, and one of the most important on account of its intrinsic value as a wine grape (and even for table use), as we derive our very best wines from the *Æstivalis*; also on account of its absolute resistance to the *Phylloxera*.

The *Riparia* has the widest geographical distribution of any of our grape-vines and is the hardiest of them all; is called the Riverside grape, a rather inappropriate name, as there is another species of grape-vine in the river and stream bottoms, *Vitis Cordifolia* (frost or possum grape), which mislead even some very intelligent men by classing them together, as they are entirely distinct from each other. The *Riparia* leafs out, blooms and ripens the earlier and propagates easily from cuttings; the *Cordifolia* blooms and ripens later (hence its name), and it cannot be propagated readily from cuttings.

Here I let the further classification rest, otherwise this paper would become too voluminous and I desire to dwell only on the above species, as we are living in the home of the *Æstivalis*.

It is to be regretted that most of the practical grape-growers are unwilling or unable to study the botanical characteristic of the grape-

vine, although whenever they buy an animal or desire to breed some of their stock to other animals the first thing they inquire about is pedigree, yet they never think of inquiring into the important pedigree of the grape-vines they cultivate. Yet without such investigation they never can determine to which species a cultivated variety belongs and thereby know what qualities it will have; what kind of soil and location is most suitable; its propagating quality; its being more or less subject to certain diseases; whether more or less hardy and productive, etc., nor will they ever know how to appreciate the arduous work and the amount of time and money spent by the indefatigable and zealous producers of the new and superior varieties for the grape-grower's special benefit.

Notwithstanding that there are thousands of varieties of grape-vines in existence in the world today, yet the grape-vine is peculiar to the growth of definite climatic conditions.

No one grape is suited to all localities, neither is there any one locality which is suited to all grapes.

The Bushberg Grape Manual, on page 3, says, "notwithstanding that over 1,500 varieties are cultivated in Europe, yet the number of kinds especially adapted to the different localities is very limited for each of them, and we seldom find more than three or four varieties to form the main bulk of the vineyards of the different sections; each province, county or township even having its own special favorites;" which is perfectly correct save that the Manual does not go far enough, as the vineyards of Badacson, Tihany and Fured in Hungary are only two or three miles apart, and yet they produce distinct and leading wines different from each other; they, as well as Somlyo a few miles away, are upheavals out of a level country with a perfect demarkation, as the whole surrounding country consists of a deep black soil, yet the soils in these vineyards are all mulatto soils.

There are but few localities in the world where the grape will, in favorable seasons, grow to perfection.

As there are very few places where all the requirements are united to produce perfect grapes and wines, which are—clear sky, dry atmosphere, high temperature—not over six inches rainfall on an average for the growing months of April, May and June, and not over four inches average for the maturing months of July, August and September, a self-draining dry and warm soil containing special virtues, and a proper elevation.

The grape-vine possesses greater absorptive power and assimilative capacity than any other plant; by planting it into a congenial soil

containing special virtues it will partake of them and impart the same to its fruit.

Thus the climate, the mean temperature as well as extremes, the length of the growing season, the relative amount of rain, the altitude and particularly the soil have an almost incredible influence on various varieties of grapes and a judicious choice of location adapted to the grapes, and of varieties adapted to our location, its climate and soil, is, therefore, of the first importance.

The southern slope of the Ozarks is one of the very few favored localities where grapes can be grown to perfection in favorable seasons; where the most advantageous atmospheric conditions, altitude and the proper soil are united, the altitude averaging about 1,200 feet above the sea level.

After the proper altitude and atmospheric conditions are obtained, the main factor is the peculiar quality of the soil in the production of the best grapes and wines. To illustrate it more forcibly, I will name the world-wide celebrated Hungarian Tokay wine for example: the territory producing it in Hungary is very small, covering only a few square miles, with a distant demarkation of its lines, and if a vine of it is transplanted beyond its limit, be it ever so near, without losing its botanical identity, it degenerates from its former qualitative production, regaining it when returned and replanted.

The Bushberg Grape Manual very forcibly illustrates this in a note on page 32, having reference to the Gyöngy Szőlő (Pearl Grape) as being an inferior grape, though grown at Tokay (of course, planted outside of the proper limit).

Bearing on the same subject, I will still further illustrate the especial quality of the soil in a particular locality as containing special virtues not contained elsewhere.

The country surrounding the city of Angora (Asia Minor), consists of a barren, red, gravelly-like rolling mountains, producing only a certain kind of weeds, similar to our horse mint, on which the silk goats live principally: the territory of the weed's growth is also small—to the best of my recollection, it will not reach the size of our Howell county (I lived there)—and if the goat is removed from there his silk degenerates into a coarse hair, neither can these weeds be raised outside of their natural region and retain their virtues: but if the same goat is returned to its native land it will regain its former silk.

Therefore, I particularize the soil on the southern slope of the Ozarks when I state that this will be the grape-growing country of the United States: here we have the clear sky and dry atmosphere, a high temperature and very little rainfall for the maturing months of July,

August and September, a long dry fall season, and a less change of temperature than 59° Fahr. in 24 hours at any time of the year: the soil is dry, porous and self-draining, containing different inexhaustible mineral plant foods requisite for the production of rich and delicious fruits and possessing the embodiment of all the elements for the production of perfect grapes and wines.

I have lived here in the Ozarks for 30 years and our *Æstivalis* vines never failed as yet; therefore, let the grape-grower follow and assist nature, it is his best guide, but whenever he undertakes to lead or force nature it will drop him in the mire with inevitable loss.

If he can not be otherwise persuaded, let him cut off the timber on a patch of ground on the hill where there is not even a visible wild grape-vine growing, leaving it in that condition; in a few years time he will find a mass of wild *Æstivalis* grape-vines growing on it, and if there is some living water near by he will also find *Riparia* mixed with it, but no *Labrusca*; should he desire to be convinced of these facts without waiting for years, let him examine some neglected corners in some of the fields reaching up the hillside, as well as the fence rows, and he will find the same wild vines there which will clearly indicate to him which family of grape-vines to plant on the Ozarks.

The accepted maxim in grape culture is, plant only of those species of grape-vines the wild ones of which grow in the woods of the respective localities, in order to be successful; the grape-vine is a fish out of water wherever and whenever planted outside of its native soil.

The Ozarks being the home of the *Æstivalis* and *Riparia*, plant none but them; they are the healthiest, hardiest and best grape-vines we have.

Wm. Saunders, Supt. Experimental Station U. S. Dept. of Agriculture, Washington, D. C., commenting on the *Æstivalis* says: "This species is pre-eminently the wine grape of the South Atlantic states and of the lower Mississippi Valley and Texas, the berries are destitute of pulp, the juice contains a larger per centage of sugar than any other improved American species, the foliage is not so liable to disease as that of *Labrusca*, and in the berries rot is also less prevailing; in some varieties of this class, as Norton's Virginia and Cynthiana, it is comparatively unknown.

"The most genial home of those species is the country of the Ozark hills in Missouri, South Kansas, Arkansas, Texas and the Indian Territory, probably also the mountain slopes of Virginia, North Carolina and Tennessee, and these must be looked upon as the grape producing regions of this continent, east of the Rocky Mountains for a certain class of fine wines.—Bushberg Grape Manual."

The good wine grapes raised on the Ozarks will create a No. 1 market for themselves just as soon as they are raised and it becomes known to the wine-makers of the country that the grapes can be had; they will be eagerly on hand (more so than they were after the peaches this year) to buy the grapes of those who are unable to make it into wine because it requires more capital, and of those whose conscientious scruples deter them from doing so, at prices that will defy competition with the Labrusca.

Let it be borne in mind that the wines stand in the same relation to each other for quality and value as the metals do. Iron and gold are both metals, yet what would the grape-grower think of the man who mines iron on his premises when he could mine gold with less trouble and expense?

The fermented pure juice of the grape, called wine, is not only a beverage, but medicine and food also. It is that universal oldest remedy against human afflictions, that elixir which invigorates man as no other stimulant or medicine can.

While wine will intoxicate if used to excess, nevertheless is in itself an aid to temperance.

After becoming accustomed to wine-drinking, the amount it takes to satisfy one's thirst will have no effect as far as intoxication is concerned and, after one's thirst is satisfied, he does not crave more (unless he be a glutton who drinks it, because it is wine and not because he thirsts for it); and distilled spirits become so distasteful that even their scent is objectionable; consequently wine cures the thirst for distilled spirits, instead of exciting it.

Our temperance societies, with their aim of absolute prohibition, virtually assist and uphold the use of whisky, as the whisky element is fighting the American wine as much as the temperance societies do, knowing that whenever the people take to the use of wine their business will go to the wall.

Wine-drinking is a benefit even to the drunkard, as he retains his senses in his drunken state, and it does not turn him wild, and a cup of strong hot coffee will sober him in 15 to 20 minutes, unlike being drunk on poisonous distilled spirits, which is likely to give him the delirium tremens.

I have reference to the pure juice of the grape as stated above, and not the abominable adulterated wines made by some of the grape-growers in the rural districts. First, they usually and principally raise the Labrusca family of grapes, which is so poor in saccharine that they have to add sugar in order to create the necessary amount of alcohol to keep it when made into wine (otherwise it would turn into vinegar).

which unfits it for pure wine. There are few localities where even the best *Labrusca* varieties will attain the required amount of saccharine. Second, some adulterate their wine by adding sugar and water, and some of them add even poisonous coloring matter unfit to drink.

The difference in the ratio of drunkenness, diseases, crimes and insanity between wine-drinking and distilled spirit-drinking countries is very great to my own knowledge, as Hungary is a wine-drinking country and the adjoining Poland and Russia are distilled spirit-drinking countries.

Desiring to obtain official statistics on the subject, I applied to the State Department at Washington, D. C., but failed to obtain them, as they have none ; hence I am unable to furnish an official statement.

Wine is grown and used all over the civilized world, and is prohibited only in China and among the Mohammedans, whose religion forbids them to use intoxicants. But has it made them better, wiser, more virtuous or civilized ? The enervating and destructive opium and the horrible hashish have taken the place of the invigorating wine, the natural consequence of absolute prohibition. I have lived among the Mohammedans and know whereof I speak.

I am cognizant of the fact that the *Æstivalis* type cannot be propagated from cuttings, and in consequence of the extra labor involved in their propagation, they are far costlier than those easily propagated from cuttings, but any grape-grower who is able to own land on which to raise grapes, is certainly able to procure a few of them at least, and by perserverance he can soon raise plants from them by yearly layering, which will enable him to plant acres in due course of time, and in the meantime he can raise some grapes also on the remaining canes.

LIST OF VARIETIES.

Norton's Virginia, *Æst.*, Bertrand, Rip., Herbemont, *Æst.*, Far West, *Æst.*, Marion, Rip., Bacchus, Rip., Montefiore, Rip., Clinton, Rip., Cynthiana, *Æst.*, Brant, Rip., Munson, Line Rip., Cunningham, So. *Æst.*, Elvira, Rip., Rulander or St. Genevieve, So. *Æst.*, Deleware, *Æst.*, Louisana, So. *Æst.*, Devereux, So. *Æst.*, Missouri Riesling, Rip., Baldwin Lenoir, *Æst.*, Ozark, *Æst.*, Kentucky, *Æst.*, Ruby, Hybr., Longworth, Line. *Æst.*, Dr. Wylie, *Æst.*, Laura, *Æst.*, Dufour, Line. *Æst.*, Woodburry, a white seedling of Deleware, Darwin, *Æst.*

The following are very highly recommended for extra early, fine market grapes: Jewell, *Æst.*, White Jewell, Rip., Golden Gem, *Æst.* Hybr., Early Ohio, Shelby, *Æst.* Rip.

All the intelligent grape-growers should procure a few of the above vines that are recommended for trial, and report on their merit or de-

merit as a vine may give perfect satisfaction in one locality and dissatisfaction in another; thereby we can intelligently ascertain in the shortest space of time, the successful vines for the different localities.

P. P. DOBOZY, West Plains, Mo.

DISCUSSION.

In reply to questions, Mr. Chandler said: Vines don't die after fall pruning. Poeklington is among the best white grapes for the market. It is of poor quality, but showy, like the Ben Davis apple. Niagara and Moore's Diamond are fine white grapes. Niagara is not tender with me. I use a trellis with two No. 12 wires; the lower about two feet high, the upper about four feet. Moore's Early will average from eight to twelve pounds to the vine; not as productive as Concord, but best black grape in quality. Brighton is the best red. Goethe is not up to the standard for profit. Jewell is no good. Early Ohio is of poor quality. Agawam I have not fruited. Campbell's Early is very promising. I have not fruited it, but a neighbor has. Delaware is not a success financially. Woodruff is good and very handsome. My vines are eight feet apart each way. Black grapes pay best. Goethe the past season was well colored and brought twice as much per pound as Concord. I know a man who successfully kept grapes in cold storage, but it did not pay this year. How it may work in other years I don't know.

Mr. Murray—In New York they don't have artificial cold storage for their grapes.

Prof. Whitten—It is said that they keep them in warm places to dry the moisture from the stems and then put them in baskets, but not in cold storage.

Mr. Bomberger—Experience of eight or nine years in keeping grapes shows that it makes a good deal of difference where the grapes are grown about their keeping. New York grapes grow in poor soil, among rock. Their clay soils grow grapes with thin, tough skins. Grapes grown in a country like this, where there is a retention of moisture, do not keep well. Sometimes I can keep Concords six weeks in good condition; at other times they spoil in two weeks. There is no earthly excuse for us buying our grapes from Ohio and New York. There is a market anywhere if you will make it by putting the right kind of energy into your business.

Mr. Chandler—You must keep up cultivation. I use a 1-horse, 12-tooth cultivator; some use a spading harrow.

Mr. Boueher—The Planet, Jr., with a horse is the best cultivator. I don't like the one pushed by a man, unless it is some other man.

Mr. Barnes of Kansas—One of the most important points is keeping the grapes. Our Iowa friend finds New York grapes now in the markets here at higher prices than we could get for our home grown grapes. Our grapes all mature too early when the weather is warm, so we can't keep them. New York grapes ripen later when the nights are cooler. They put them in cool houses.

Mr. Snodgrass—I propose to grow Moore's Early and get rid of them early in the season. I succeed in growing it.

Mr. Bomberger—When Moore's is gone Worden is ready. It is nearly as large as Moore's, but they don't ripen entirely uniformly. Moore's all ripen at once.

Prof. Whitten—The cause of the grape rot is very well known. It is a fungus disease, propagated by spores too small to be seen with the naked eye. Rotten grapes are full of them. They are found on the posts, old leaves and on the ground. On warm days in the winter they are being scattered. In spring they germinate very rapidly when conditions are right. It works in the leaves as well as in the fruit. It also goes into the vines. Spray with Bordeaux mixture to prevent it. We can keep grapes from rotting to a reasonable extent. We have 110 varieties on the experiment grounds at Columbia. We sprayed four times, and practically kept off the rot. Spray first before the buds open in the spring; second, after buds are open, before blooming, and twice after blooming. Some varieties rot worse than others. Moore's, Worden and Concord can generally be saved by three sprayings.

Mr. Snodgrass—Herbemont is the best grape for white wine; Norton for red.

Mr. Patterson—Our fruit building is on top of the ground, without any floor. The walls and roof are about one foot thick with five dead air spaces. It has a sky-light six feet square, and double doors. If we want to cool the house we open the sky-light and doors on cool nights in October. It is practically frost proof, but if we find the temperature going too low we use a stove. The cider from the culls paid for all the barrels and for picking the apples. We usually get about twelve and a half cents a gallon for vinegar.

Mr. Gano—Some apple-men sell their cider fresh every day in the city.

Secretary Dunlap—I wish to ask a question. You have some fruit-houses in the ground. I wish to know what effect the ground has on the keeping of the apples. The ground is usually about fifty

degrees. Does not that temperature raise the temperature of the fruit?

Mr. Boucher—I have a little fruit-house holding eight hundred bushels built on the ground right in the orchard, with walls about one foot thick, filled with saw-dust. It keeps apples all right.

J. C. Evans—Mr. Dunlap wants to know the difference between houses above the ground and those under the ground as to keeping apples. Our experience is that an earthen wall will keep apples better than any other kind of wall. The earth absorbs the spores of the rot. We can regulate the temperature in either case.

Mr. Dunlap—How do you keep the earth from falling in?

Mr. Evans—We set white oak posts and put black jack poles behind the posts. The cracks between the poles allow the earth to take up the rot spores.

Question: What is the best way to dispose of the culls?

Secretary Goodman—The best way this year was to evaporate. Evaporated apples are bringing a good price.

Question: What is the most rapid way of thinning fruit?

Secretary Goodman—Men's hands, and the surest way, too.

Mr. Snodgrass—I employ women and girls. They are cheaper and better, too.

A voice—Perhaps you don't pay them enough.

Mr. Snodgrass—I pay them what they ask.

Question: Name a good fruit or nut tree for wet places.

Mr. Evans—The pecan.

Mr. Bomberger—I grow native plums. I cut back the trees and prune out the weaker branches. This reduces the amount of fruit the trees will set. I also thin severely. Such treatment makes fine fruit and is also better for the tree. Does anyone know anything of the Mayflower plum?

Nobody knew anything of it. Some one suggested that it must be related to John Lewis Childs.

NEW IDEAS IN POTATO CULTURE.

There is an old saying that runs like this, "Try all things, and hold fast that which is good."

But many have forgotten the first clause, and so only hold fast to the old methods that have been followed for years, regardless of the fact that the present is a time of great advancement, and that all lines of labor have been revolutionized by new inventions and discoveries.

The farmer and fruit-grower, of all men, should be the most progressive and should most assuredly "Try all things, and hold fast that which is good."

It has been one of my hobbies to try all things in my line, so far as it was in my power, and in doing so, I have spent much labor in testing hundreds of varieties of potatoes. I have also grown thousands of seedlings myself, and a few of which I am happy to say have proven to have merit, and have become quite generally known throughout the country. Others of my seedlings give much promise at the present time, that two of them have been named "Klondyke" and "Yukon."

But the object of this paper is not to speak of my successes and failures, but to tell you a few facts that I have dug out in my study of that greatest of food plants, the potato.

First, I want to call your attention to the idea that has been growing popular for several years in some sections, regarding what is known as Southern second crop seed. Many claim that such seed is even better than the Northern seed potatoes, which so many Southern planters have been in the habit of purchasing each succeeding year.

Now, I set out to discover if this was a fact, and if so, why it was so. If this second crop seed is better than all other seed, there must be some reason for its being so. I have never read or heard any reasonable explanation of the fact, and so have devoted considerable study to the matter, and believe that I have found the reason why it is better for seed, than much ripe stock, and am willing to admit that in part the claim is well founded.

It is claimed that the so-called "second crop seed" will keep sound and firm until season for planting has arrived. This is true, and in this fact, I believe, lays the entire secret.

I have discovered by continued experiments that when a potato is perfectly ripe, unless kept in practically cold storage, it will very soon begin to wilt. In other words, it evaporates a part of its moisture, thus leaving the tuber shrunken and less fit for seed purposes; in the same way that a wilted cutting of currant or other plant grows less vigorously than an unwilted one.

Repeated observation shows that a tuber that has not reached full maturity will retain its moisture, and for many months continue as firm and solid as when dug, under conditions where a ripe one will not. Such a potato often on being cut for seed, will crack ahead of the knife, it is so brittle, and the juice will run from it as from a newly dug tuber. It is in just the condition to give its sprouts the necessary amount of moisture to start a strong, thrifty plant suited to produce a bountiful crop.

The fully ripened tuber on the other hand has already passed the prime of life and is on the decline, as soon as wilted. Its sprouts have not the necessary vitality to give them a proper start in life, any more than have the offspring of aged animals or the buds of a shrunken currant cutting.

It is a well established fact in animal husbandry that the offspring of animals that have only reached the full flush of maturity are much thriftier than those of animals that have begun to go down the decline of life. The same law holds in the propagation of plants of all kinds; propagate from the strong, thrifty and robust, but not from the weakly declining plants that are withered or are approaching old age.

You never cut your grafts from old or shrunken wood, but from young, vigorous growth. Bear in mind the potato is not a seed, but is a swollen, underground stem, in which are stored up starch, juices, etc., for the feeding of the young sprout.

Perhaps you will say, why is not the fully matured tuber better than one half grown? For certainly it would stand to reason that it would be better supplied with the necessary chemical constituents than the smaller, immature tuber can be.

I say that, under right conditions, it is. But in order to retain this vigor of full maturity, you must at once, by some process, provide a method of suspending all life action. In other words, you must retard nature's plan. For in that plan, maturity once reached, then comes decay and the wasting away of old age. And with that comes the loss of vigor, and with this loss of vigor comes inability to produce vigorous and robust offspring.

The fully matured potato, if it could be used soon after maturity, or kept from all contact with warm, dry air that would cause it to wilt and deteriorate, is as good seed as can be had. But it is a fact that very few growers can, and still less do, give the proper care or have the necessary facilities for thus keeping their seed. Their mature seed is, therefore, wilted, and for that reason a small tuber that has not reached full maturity and will not at once commence the downward run to old age and decay, is greatly to be preferred to a mature one that has already begun that decline.

My observation has repeatedly shown that mature seed stock, which had been so kept as to be in prime condition at planting time, is as good, or better, than second crop or late crop seed.

Central Wisconsin being too far north to successfully grow two crops of potatoes in a season, we have been experimenting with what we call a late crop. To get this we plant good, sound seed at intervals of a few days, up to as late as July 22. For some reason very early

planted potatoes are not a success with us, and our main crop is planted entirely in June. The past season we planted most of our crop between June 8th and 22d, and I can assure you that I never saw so fine a crop before in my 20 years' experience as a potato crank.

The exhibit of potatoes on your tables from the Riverdale Seed Farm will, I am sure, convince you that our crop was all I claim for it. On June 29 and 30, on a piece of very poor sandy upland, we planted two acres which yielded 220 bushels of medium sized tubers. This was the earliest of our late crop. Our main crop, on river bottom land, run from 200 bushels per acre up to 433 bushels per acre without any special preparation of soil.

We aim to plant our potatoes on soil with only ordinary preparation, so that we know that the varieties that we advertise are well suited to the average farm method of cultivation. We have known of many varieties which would yield enormously on very rich, highly cultivated lands that were practically worthless for ordinary farm use.

Our Wisconsin crop is planted so late that it matures late in the fall, and, kept in a good storage-house, our crop is like second crop seed, and will keep much better than potatoes that ripen early and then lie through the long hot fall months.

In our experimental plats, planted during July, we secured some fine yields of smooth tubers about the size of hens eggs and larger, a sample of which you will find in our exhibit. These will make the best of seed, and we intend next season to plant a larger area during July, if the weather is suitable. We shall use that seed ourselves for part of our planting to further determine the merits of mature potatoes, when properly kept, compared with second, or late crop seed.

There is a law of nature that is as unalterable as was the laws of the Medes and Persians, that all vegetation is at its greatest vigor in the colder part of its zone of growth.

Perhaps I am wrong in applying this rule alone to vegetation, for without doubt the law applies as well to animal life as to the vegetable kingdom. We see it in the human race wherever we go. The people of the temperate zones have more energy, push and vigor than those of warmer climates.

By repeated experiments we find seed potatoes conforming to this law. Northern grown seed, other things being equal, will always be preferable to that grown in a more southerly latitude.

Of course Northern grown seed, to be at their best must be grown with care and a thorough understanding of the needs of the plants, and after being grown, the crop must be harvested, cared for and

shipped in a manner that will retain the full vigor and hardiness gained by its production in the North.

HOW WE KEEP OUR POTATO CROP HEALTHY—SCAB AND ITS PREVENTION.

I wish here to speak of two things that, although not exactly new, as they have been recommended by our Experiment Stations for several years, yet, are new to the great mass of potato-growers. I refer to the soaking of the seed in Corrosive Sublimate, as a preventive of the potato scab, and the spraying with Bordeaux mixture to prevent the early and late blights.

No one should ever plant a field of potatoes without first soaking the seed in the Corrosive Sublimate solution (2 oz. of Corrosive Sublimate to 16 gals. water). Even if the seed appears perfectly free from every trace of scab, soak it, as the germs of scab may be clinging to the skin of the tuber. The expense is small, and the remedy sure, if the treated seed is planted upon land free from the germs of the scab.

HOW TO PREVENT BLIGHT.

Bordeaux mixture is just as sure a remedy against blights as is Corrosive Sublimate against scab. But one thing must be remembered, and that is that it is not a cure, but is a preventive. In using it you must commence early and apply it as often as necessary to keep every leaf coated with an armor plate of copper. Then the germs of the dreaded blight will not be able to gain entrance. Don't apply it once or twice and think that will do, as you will very likely to lose entirely the labor expended in the first applications. If you take up the battle you must keep it up until the season is over, or your labor may be in vain. In a wet season you may have to go over your field as often as once a week, or even oftener. The only safe way is to keep that armor plate solid or the little foe may enter. In an ordinary season, four or five applications give very satisfactory results.

POTATO SEEDLINGS.

There is one other new idea that has been advanced by one who has had considerable experience as an originator and grower of many kinds of potatoes, that is so far in error that I wish to speak of it here. I refer to a theory expounded by E. S. Carman, the venerable editor of the "Rural New Yorker," who says: "That in growing seedlings, the best shaped tuber from the hill should be selected the first year, as a foundation for the new variety, and that it will follow that shape or type in the years to come."

It does seem strange that a grower of such great experience should advance such a theory, as it is totally wrong.

Each seed from the seed ball is an individual life germ, and in some respect differs from all other such life germs. The tubers produced on the plant the first year, are, like those of each succeeding year, only a part of the plant. In other words, a swollen, underground stem with buds or eyes to carry on the propagation of the variety.

I have often found that a seedling may, the first year, be long and slim, and in after years change its shape to an oval, flattened form, as seen in the samples of my seedling No. 99.

Again a seedling may be nearly round the first year, especially if a late variety and not matured, and the next season may develop into a long, slim tuber. In fact, very little can be told as to the future appearance and value of a seedling from its first year's growth, further than that a healthy, vigorous grower with a limited number of smooth, well formed tubers of fair size may be expected to do even better the next year, and so on for several years to come. But often the expectations are not realized, in the growing of seedlings, but nevertheless, no branch of horticulture has so much of pleasant anticipation as the originating of new varieties.

DISCUSSION.

Prof. Whitten—What is the condition of the tops of your late planted potatoes when frost comes?

Mr. Reed—The tops of our late potatoes were green as late as the 10th of October this year, though other plants had been killed a month earlier. The potatoes were on the river bank. The water saved them. They are usually frozen down while green.

Question: Has Mr. Reed found any beneficial results in getting potatoes for seed from the north or east of him?

Mr. Reed—No; I don't think it would be any advantage, for our climatic conditions for the potato are almost perfect. Our soil, a good sandy loam, is also an ideal potato soil.

Mr. Murray—I like the paper very much. I think it pays us here in Missouri to get our seed potatoes from a climate north of us. We ought to get our seed of any plant from the country or locality where the plant reaches its highest development.

SEVENTY YEARS IN HORTICULTURE.

My paper is quoted 50 years ago, but I will change it to 70, for I can well remember that, when about seven years old, I saw the men bury some sweet pippin apples in the garden late in the fall. There were still some of the same kind of apples on the trees, which I gathered and buried also. Not as they did, but after my own plan; simply digging a hole in the ground, putting the apples in and covering with earth.

The following spring, when the other buried apples were taken out and used, and gardening commenced, I went into the garden just as they came across my apples, which I had forgotten. The first thing I was among the men claiming the fruit, which they refused to give me, and were not willing to give me even a part. Then the bugle sounded for battle. Whether it was a spade or rake that I made the attack with I don't remember, but do remember that some of them would have been hurt if my mother had not just then came upon the scene, who accomplished a compromise by giving me half.

And now I will relate a singular affair in relation to this apple. I had not seen one for 60 years until a few months ago a friend of mine, U. J. Hutchinson, of Long Lane, Mo., sent me a specimen, which recalled the above affair, the first horticultural operation I recollect of.

My early surroundings—I was born and mostly reared six miles southeast of Lancaster City, Lancaster county, Penn. The house was about 60 feet long, built of limestone rock. The east end was three stories high, which was built on sloping ground, thus requiring terrace walls for the yard and garden. Southeast from the east side of the terrace wall there were two vines of golden chassaleas grapes that were laid down in winter and covered. In the spring they were tied up against the wall and trellised above. Had we then known how to avoid mildew and rot, these vines would have been a success, but as it was, we seldom got any ripe fruit. The last time we put them down, when to be uncovered the next spring after, there was nothing left. The stump-tailed mice and rats had eaten root and vine, nothing left. On this terrace were apricot trees, which sometimes gave us fruit, but not often. In a corner of the garden was a purple magnum bonum plum tree, the fruit of which never ripened. We called it getting wormy, not knowing anything of the curculio then. In the house yard, when the ground was nearly bare, we had a prune tree, and a yellow gage, that seldom failed giving crops of superior fruit. I can remem-

ber how I used to stand on the porch during a thunder storm, when the ripe prunes were likely to fall, that when a flash of lightning or a fallen prune would be located, when I would run out in the darkness that followed and usually succeed in securing the prune. The getting wet was not taken into account. And here let me say that at this day, after all our efforts, we have no plum to surpass the yellow gage in flavor. Some of the happiest of my days were spent there. In the month of May, when the fruit trees were in bloom, the garden redolent with the fragrance of flowers; the birds singing all around, and I could look out over the orchard, the meadow, and a green tangled wild weed, it was my glory, even if there was no (Old Oaken Bucket) hanging in the well. A never failing well at the house, and 40 yards down the slope was a noble spring which sent its water to the Peque creek 200 yards off, and up which little stream little fish would come, some of which would take the underground passage up to the well, and would frequently be pumped out.

Near our place lived two old bachelors. Each had his house-keeper and hired boy. The one a regular book worm, and called his big brother a fool—one was quite small and the other a large man. The big man was quite a horticulturist and had a garden of one-eighth of an acre, I think, in which he had all kinds of flowers. He paid particular attention to bulbs, and in June his garden was open to the whole community on Sundays, while they lasted.

In no garden, in all my career, have I seen such a display of tulips and hyacinth beds, 100 feet long and 4 feet broad, as thick as they could all stand, of all colors and sizes. He had select fruit also, among which was what I now believe was the Herbemont grape, which ran over the apple trees in the orchard and bore bushels of grapes. Years after leaving Lancaster county I went back and got cuttings from every vine around there, hoping to secure the variety, but in vain. After coming to Missouri and finding the Herbemont, was satisfied that it was the long lost grape.

This same man had wild geese, Chinese and common ones; different kinds of ducks; both white and speckled Guinea fowls and pea fowls.

In April, 1837, we moved to Cumberland county, Pennsylvania, where my father bought two large farms, upon both of which were beautiful springs, one of which ran under our dwelling-house, and alongside of the spring I trained a red egg-plum tree against the wall of the house that bore crops of perfect fruit such as I have not grown since.

Farming did not suit me, and I longed to grow trees and plants. A younger brother and I started a nursery, which we enlarged greatly,

when I went to Lebanon county and started one myself. It was a fair success, and after building a cottage in the outskirts of North Lebanon and living there a few years, I bought 14 acres of land two miles northeast of town. There I had a collection of fruits that could not well be found elsewhere in those parts. There I raised the Louisa grape, a decided improvement on the Isabella, but the big growers pronounced it Isabella, and it never became popular. Some years after the Concord came out, and I bought a vine for \$5; at the same time requested Mr. Bull, the originator, to send me some seeds of the fruit. He sent some, out of which the Marietta was raised; also Eva, another white one, that was perhaps equal to the Martha. But after Mr. Knox had paid me \$5 for the Martha, Eva was in a measure dropped. I am satisfied that Mr. Knox made \$10,000 out of it. I never envied him in the least. A man once said I was a fool for selling it at that price. A friend standing by remarked that he supposed friend Miller would make a fool of himself again in that way. "You bet he would," was my reply. In 1867, joining the Bluffton Wine Company when I came here, my tree and vine affairs were conducted for others, and the first season I grew about 70,000 plants.

Soon I cut loose from the Bluffton Wine Company and worked for myself. Went into growing small fruits and trees. I had a good selection of strawberries, the seeds of which were scattered all around by the breeze, and one day, while plowing in an old orchard, discovered a seedling, which I saw just in time to prevent covering with the plow. It was taken up and planted on a terrace east of my house, but a grub attacked it, and if I had not discovered it at the time, there would have been one popular strawberry less on the list. I am often asked why I gave such a noble fruit such a bad name. It was simply because when nearly all the roots were eaten off it still lived. One day I remarked that that plant is like the Indian chief, Capt. Jack (that was then giving our soldiers such trouble in the Lava beds in the west), and Capt. Jack shall be its name. Since then I have not brought out anything of much merit, but believe I have something fine in a seedling Cuthbert raspberry; have also a seedling Seckel pear tree that may bear next season; a tree each of Gov. Wood and Napoleon cherry that may bear next season. So it will be seen that I am still experimenting.

I keep posted on the new grapes. Am disappointed in the Columbia Imperial. Have two vines of Campbell's Early that can bear next year; have also planted three vines of the McPike grape and ordered three vines of the Kentucky. I have the famous Soudan raspberry, Miller's Early Red and Cumberland, the latter the grandest of

all the black-caps. These latter have fruited and promise great things.

Coming to a late date, I will tell my last misfortune. Nearly an acre of strawberry plants set out in the fall of 1896, which were to be treated all summer, so as to make a big show next season, have all gone where the woodbine twineth. Am just waiting for a man to plow the whole thing under. How did this happen? some will ask, that a man like old Miller can fail thus? The answer is simply this, that when the better crops of berries were gathered, and the cultivation should commence, there was already a fair start of weeds, crab grass the leader; when rain after rain came, and the ground at no time fit to work properly; when the rains ceased, the weeds had such a start that it would have been a useless job to clear them. The strawberry plants seemed to hold their own for a long time, and by mowing the grass down even with the plants, I hoped to carry them through.

But when no rain fell for two months to amount to anything, and the mercury for days and weeks ranged from 90 to 100 degrees and more, they had to give up.

All I have left now is perhaps a few thousands of the newer variety, that were near the spring, and which I kept alive by carrying water to them. But will this stop me from growing strawberries? Not if I am spared. So long as able the hand-spade, trenching-fork and trowel will be wielded. I feel like the late Mr. Muench, who said he expected to die in the harness, and today it was fulfilled, for he was found dead in his vineyard with the pruning-shears at his side, as I have been told.

Horticulture has its ups and downs like everything else, but if there is any occupation in life that gives more pleasure, I have not been able to discover it. Soon my time will come to be ferried over the dark stream, but one of my last wishes will be that this noble pursuit of horticulture will receive the attention that it deserves.

And now when we have all the new apples that we are so proud of, how many have we to surpass in real value the yellow Bellflower, Rambo Red Romanite, Winesap and Newtown Pippin, which are about 100 years old.

Talk about a fruit running out, I don't believe it. It is the want of proper attention that causes the degeneracy. I have gathered as fine Romanites this season as ever I saw. Among my collection exhibited here are two new ones, that promise well. A sweet one that our late Brother Holman gave me some years ago, and the Lexington. The latter on young trees in the nursery five years old.

SAM'L MILLER, Bluffton.

THURSDAY, 8 P. M.

Mr. Atwood, of Greene County—I feel that I must say something of what the people of South Missouri are doing in the way of co-operation. We shipped this last season four hundred cars of strawberries. We have thirty-seven associations all united in a larger association. Every association has made money by co-operation. Without co-operation the growers often lost. Twenty-one cars of strawberries shipped from Peirce City netted \$1.01 per 24-quart crate. In Arkansas they have twenty-five associations, which are doing good work for the fruit-growers. We are going to associate in the shipping of apples and other fruits as well as strawberries. At times, before these associations began their work, some cities would have a glut and others no fruit. For instance, eight cars of strawberries went to Pittsburgh in one day and broke the market. This we must avoid.

What Mr. Bell said reminds me of another thing. The United States Consul at Hamburg, Germany, informs our government that the German farmers make the beet sugar themselves by co-operation. If the farmers of this country succeed in making sugar they will have to do it themselves.

Song.

INSECTS.

Let me give you a general talk about insects, with the hope that you will take some of it home with you and learn something of insects. All insects lay eggs, with two exceptions, the San Jose scale and a certain fly. These two never lay eggs. Insects are divided into two classes. In one class the young resemble the adult, as the grass-hopper; in the other class the young have no resemblance to the adult. The young of this class are commonly called worms, as the apple-worm. We call them larvæ. When the larvæ is full grown it changes into a pupa or chrysalis, from which it emerges at the right season. As to their method of feeding, insects are sucking or biting. Insects do not change from sucking to biting, or the reverse. A biting or chewing insect bites or chews in all its states, and a sucking insect remains a sucking insect in all its stages. The first thing you ought to notice when an insect is troubling you is whether it is a biting or a sucking insect. Upon this point depends the remedy for it. The sucking insects stick their beaks through the tissues and suck the pure juices from beneath. So no poison will kill them, for they do not get the

poison which is on the outside of the plant tissues. Many mistakes are made along this line. For sucking insects, nine times out of ten, use kerosene emulsion, powdered tobacco, tobacco tea or pyrethrum. These substances must touch the insects, for they kill only by contact. If the insect you are dealing with is a biting insect, then you employ the arsenites, with the hope that they will eat it and be killed. For biting insects, I advise Paris green, rather than London purple. Most persons use London purple, but it is more variable in its composition than Paris green. It is only a by-product of other manufactures, and is not made for itself alone. Pure Paris green can be obtained on the market, though much of it is adulterated. London purple is of such uncertain composition that you may spray with a certain result one time and a very different result at another time, or with no result whatever. Buy from reliable houses and insist on having pure goods. When you are using arsenical substances, see that the mixture is constantly stirred. Do the work thoroughly. Many make the mistake of using the Bordeaux mixture against insects. It is a fungicide, and should never be used for insects.

One of the first requisites in fighting insects is clean culture. Don't allow rubbish to accumulate any where. Such insects as the canker-worm can be kept down by cultivation, but they may get into your orchard from forest trees and other places. The most of our injurious insects lived upon other plants before they were found upon our cultivated plants. For instance the Colorado potato beetle lived upon a nettle in its native habituals, but when it began to live upon the potato it multiplied and spread very rapidly, thriving better upon the potato than upon its original food. Some of these insects have been discussed time and again, but it seems necessary to have line upon line, and precept upon precept.

The codlin moth which makes our wormy apples is a small brown moth about one-third of an inch in expanse. It deposits its egg in the spring upon the little apple soon after the bloom drops. It soon hatches and works its way into the apple where it eats its fill, and then it drops to the ground to make its metamorphosis, then it emerges from the ground a perfect insect, making the circuit in about thirty days. The first apple I picked up from the exhibits in this room has a codlin moth larva in it; and these are selected apples. They look nice upon the outside, but many of them are bad inside.

This moth deposits its eggs for a period of twenty days, and there are three broods overlapping; so it deposits eggs all summer long. We aim to kill the first brood only. It won't pay to spray for the second or third. Use one pound of Paris green and three pounds

unslacked stone lime to one hundred and seventy-five gallons of water. Stronger than this it may injure your trees, weaker it will not kill the insect. Use a fine spray, soon after the blossoms have fallen, so the larva will get a little poison its first meal, spray again in nine or ten days. If it rains soon after you spray, repeat the spraying and don't count that time. If the work is well done you can kill fifty per cent the first year; seventy-five the second year, and ninety the third year. Stock eating apples as they fall will kill the worm, that may be in the apple, but many of the worms emerge from the apples before they fall; so picking up the apples will not prevent them from increasing.

Borers are two kinds, round-headed and flat-headed. The former does the greatest amount of damage. The round-headed borer is hatched from eggs deposited at the base of the tree near the ground. The first year it stays in the cambium layer; the next year it eats into the wood, and the third year emerges in the beetle form. What can we do to prevent it from harming our trees? Washes, wrappers and cutting it out are the remedies employed. The best way is to combine all three of these methods. I will not discuss these washes; formulas can be found in the reports of this Society, in farm papers, bulletins from the stations and other places. Some succeed with these washes, others fail. If only a part of the trees in an orchard are washed, they may lay their eggs in the others. If your trees are all washed and your near neighbors are not, they may pass your trees and lay their eggs in his. These insects are bound to lay their eggs, and finding no other suitable place, they may bore through the wash and put their eggs in the tree, or they may enter at a point higher up the tree.

The woolly aphid north of here does but little damage; south it does very much. It works almost entirely upon the roots of apple trees and causes knots. These knotted roots decay, the tree loses its anchor on the ground and blows over. They are wingless, and bring forth living young. In the fall they lay eggs to carry them over the winter. At certain season we have winged forms which fly to other trees and infest them. It works under the ground so that we can not reach it with any reasonable amount of kerosene emulsion. Tobacco tea is good, so far as it goes, but powdered tobacco is the best remedy. It costs about fifteen dollars per ton. To apply it take away some four inches of soil, put in the tobacco and put the dirt back again. Rains will send the nicotine down there and kill the aphid.

The common aphid, which attracted so much attention last spring, infects the buds and leaves early in the season, and sometimes causes the leaves to rot. They bring forth living young in the summer and lay eggs in the fall, and the fact that they bring forth living young is

the reason they multiply so rapidly. They are very easily controlled by spraying with kerosene emulsion. One spraying will usually do, especially if tobacco is added to the emulsion.

If any of you are troubled by insects and don't know how to fight them, write to me, and send your name to the Experiment Station at Columbia and you will get a large portion of the necessary information in the bulletins.

J. M. STEDMAN.

DISCUSSION.

Mr. Barnes of Kansas—I want to show you how gradually these insects spread over the country. There are 105 counties in Kansas, but some of the western counties don't grow much fruit. I have here a statement of the insects in Kansas, and you may take it for granted that your State is no better off than Kansas in this respect. I have reports from 35 counties; 31 report codling moth; 14 canker worm; 31 —; 18 curl leaf; 29 black aphid; four green aphid, and 13 woolly aphid.

Mr. Patterson—Last spring we noticed the canker worm in our orchard, and before we could get ready to spray, some of the trees looked as if they were burned. Three ounces London purple to the barrel did no good. We doubled the dose; it did no good. We then used one pound to the barrel, adding two pounds of lime, and killed them by the million. One week later you could not find a single worm. We know it killed them for the ground was covered with them.

Prof. Stedman—The chances are the London purple was adulterated to some extent. Mr. Patterson may try such a strong mixture again and kill his trees, or ruin them for one season. The proportion I gave will never fail if the Paris green is pure. I will give a case from Alabama: A man failed in the use of Paris green spray to kill some insects, and wrote me a letter that would not add much to my reputation if published. Finally I wrote for a sample of the Paris green and had it analyzed by the station chemist. There was no trace of poison in it. It was made of plaster of Paris, colored with indigo and Chrome yellow. This is an extreme case, but you will find all grades of impurities.

Music.

SOME CHOICE FRUITS FOR HOME CULTURE.

Mr. President, Ladies and Gentlemen—When your committee so honored me as to request me to write a paper for your convention, I consented with the usual conceit of an amateur, little realizing the

enormity of the task I was taking upon myself until I began to cast about in my mind to find something that I really knew about horticulture: and now, while I blush to admit it, my knowledge may be classed as "News in a nut-shell," a hazelnut shell at that. Although I cannot boast much knowledge of the culture of fruit, I can tell you of some very satisfactory varieties to grow for family use.

Your committee very kindly encouraged me by telling me that nothing of a technical nature would be expected of me, so, "being a Methodist," I guess I cannot do better than to "give you my experience."

When we located in our little suburban home, six years ago last month, I was the proverbial "bundle of nerves" that our "Lords of creation" so delight in calling us weaker vessels (and I think I'm right nerry yet to undertake this herculean task), so it goes without saying that I spent a very dismal winter, full of tears and regrets that I ever gave my consent to such a dreadful move.

But with the coming of spring I felt my courage rising with the mercury, and by the time the trees were full of bloom and beauty my interest had grown into enthusiasm; nerves were less predominant in my physical make-up, and as the showery days of April gave place to the soothing, sunny days of May, a daily "communing with nature," often by means of hoe and rake, gave added health and strength and ambition, and I became an ardent lover of "all the green things growing."

Our home is the north half of a square in Northeast Moberly, consequently is level prairie land, but it has been abundantly enriched and has yielded most generously for our care.

From the coming of the earliest gooseberry to the late October peach, we are not without fruit from "our own vine and fruit tree," if not "fig-tree."

The first requisite for good fruit is good stock.

The person with only a few town lots at his disposal can, least of all, afford to plant cheap or unreliable stock; for a vine or tree of inferior fruitage or scant production will occupy just as much precious space and requires just as diligent care as a tree or vine of good stock, and your harvest will be very much mingled with disappointment and discouragement. While the extra dimes paid for reliable stock will bring in returns long before you ever taste a bite, just in the pleasure you have in watching the growth and development of what you know will be luscious fruit in its season.

To begin with the gooseberry—three Houghton's and three Downings supply my family and a good many of my neighbors, with all the pies, tarts and sauce that we could wish.

Last year, much to the amusement of the head-of-the-house, I invested in a half-dozen of what was called the golden sweet gooseberry. Not infrequently I was treated to the remark: "Nobody but a goose would expect to find a sweet gooseberry." But I am pleased to report that I gathered a box of large, finely-flavored citron-yellow, sweet berries, from thrifty young bushes that promise me a good yield for next year.

Of currants the Cherry and Dutch are my favorite. I have tried Fay's Prolific, but with poor success. All, however, were this summer consigned to the flames, as the best known remedy for San Jose scale, which Prof. Stedman and Mr. Sinnock discovered on my currants this spring.

A strawberry bed is the hardest of all to decide on. There are so many varieties, and good ones too, that it is difficult to decide on a few for a small bed. But fifty each of Crescent, Haverland, Lovett, Timbrell and Gandy, will supply you berries in abundance for four weeks—which will bring you right into raspberry season.

Of the blackcaps, Gregg and Doolittle are perfectly satisfactory to me, while Cuthbert and Marlboro are my especial favorites, and this year I planted a few Golden Queens by way of variety.

Of blackberries, Erie and Taylor are both good berries, but the Taylor is the largest and best flavored berry with us.

We have had poor success with the Wineberry and Loganberry, and were not enough impressed with their merits to care to spend time and dimes on them again.

Two Early Richmond and half dozen common dark cherries have furnished us an abundance of fruit for our own use, for several years, besides adding quite a little sum to the family purse.

After the cherry comes the purple plum—Abundance—of which we have three trees.

This is the prime favorite from the head-of-the-house to the wee tots. So we take especial pains to secure their luscious fruit. And we find that spraying with Bordeaux mixture aids very materially in keeping the fruit on the tree.

Of peaches we have one, Amsden's June, which ripens in July and is of rather uncertain quality, but is a peach nevertheless; one Champion, one Crosby, one Crawford's late, and another late, an October seedling of excellent quality, but, unfortunately, of which I know no name. Our decided preference is for Champion, which I consider the best all-around peach that has ever come under my observation. Of large, uniform size and shape, delicious flavor and exquisite color, it is certainly an ideal fruit for family use.

My experience with pears has been limited and not particularly successful. Our trees suffered from blight two years ago, and have never become thrifty. Although not in prime condition, we had some very fine pears this fall. Our favorites are Seckel, Sheldon and Bartlett. We have Duchess and Keiffer, but they have never fruited.

The free-stone Damson gives best satisfaction and is most salable. One Siberian crab and one quince are desirable for jellies and pickles. Apricots with us have proved a "delusion and a snare." They are thrifty, symmetrical, beautiful trees, but leave nothing but leaves.

The next luxury that has become a necessity, the grape, is so universally grown and enjoyed that "little may I grace its cause in speaking for it." For me nothing can rival the matchless old Concord. Moore's Early and Worden are good, and as a white, Niagara suits me. There are several very desirable varieties where one has room for a number of vines, but for a small place I prefer to stick to the old true and tried Concord as a main dependence.

Apples? I, for one, would profit by the experience of our maternal ancestress of ages ago.

Let the "head-of-the-house" provide his own apples. Buy them of Brother Boucher or some other brother. Then, if he gets a core in his throat, he can't point his thumb over his shoulder at me and say: "The woman whom thou gavest to be with me, she gave of the tree, and I did eat."

I would leave apples to orchardists (unless it would be one Early Harvest, or red June for the little people).

MRS. H. V. ESTILL, Moberly.

SAP MOVEMENT IN PLANTS.

It is remarkable how many vague notions prevail regarding the "rise" and "fall" and "flow" of sap in trees as the expression goes. It is still more remarkable how nearly correct some of these notions are and how correctly experience has taught the cultivator to apply methods of treatment that bear a direct relation to this so-called "mysterious movement of sap in plants." Comparatively few cultivators of fruit-trees have ever gained a thorough understanding of the relation of root, stem and leaves in drinking in and digesting the crude or raw sap and in distributing it to the growing parts of the tree. Nevertheless, the skillful orchardist is able to successfully graft, bud, prune, to increase the size of his grapes, peaches and other fruits by girdling the

branches, and to apply many other methods of treatment which bear directly upon this subject. A thorough understanding of the movement of sap is of great advantage, however. It is hoped that the following may contain some hints that may enable the cultivator to better investigate this subject for himself and to better understand the why and wherefore of it.

For practical purposes let us consider the tree as consisting of root, stem and leaves. The stem is composed of a central pith, outside of this the wood, between the bark and wood, is the growing layer and outside this is the bark. These different parts are made up of small hollow cells, some of them are nearly spherical, and others, particularly those of the wood, are long and tube like.

The crude sap is taken in through tiny root hairs, which are very abundant and may sometimes be seen with the naked eye along the growing tips of the tiny roots or rootlets. These root hairs are comparatively short lived. New ones are continually being formed near the tip of the rootlet as it increases in length, and the older ones farther back disappear. Being very delicate, they are also easily injured. Since the plant relies mainly upon these root hairs for taking up the sap from the soil, it is essential that in transplanting tender seedlings, these root hairs should not be injured more than is necessary. Many of them are broken and left in the soil in removing the plant, and exposure to drying atmosphere very soon kills them. If a root is broken off it can take in some moisture through the wound just as a cut flower in a vase of water can take up moisture through the cut end of the stem. Transplanted plants are liable to wilt for a time, until new root hairs can form in sufficient numbers to take up the requisite supply of moisture.

The leaves bear much the same relation to the tree that the stomach and lungs do to the animal. When the sap is taken up by the roots it is carried to the leaves and there digested in the presence of the green coloring matter. None of the crude sap can in any way promote growth until it has thus been acted upon in the leaves. It is essential to remember that it passes upward through the sap wood. This may be shown by the fact that if a ring of bark is taken off around the trunk, laying bare the wood, the leaves above this girdle will not wilt, but will still be supplied with moisture. This is true in hollow trees, in which the pith and heart would have rotted away. In the leaves (and incidentally in some green-colored stems) the food materials are digested, and most of the water of the sap is evaporated into the air. The digested food is then distributed, in the growing layer, to all

parts of the tree, where it promotes growth, some of it finding its way back to the tips of the roots, whence the crude sap started upward.

To increase the size of the fruit of a branch, the branch is sometimes girdled by the removal of a ring of bark one-half inch to one inch wide. As has been explained, this does not in any way interfere with the passage of the crude sap into the branch, but since the girdle destroys the growing layer, none of the digested food can pass downward below this girdle. For this reason the food digested in the leaves of the girdled branch remains to nourish the branch and its fruit, when normally, a part of it should be carried back to help nourish the trunk and root system below. When a branch is girdled in this way, the extra food supply soon forms an enlargement above the girdle and new tissue begins to grow downward, so the girdle, if not too wide, is often entirely healed over in a few weeks. This healing process takes place from above, downward, the branch immediately below the girdle not increasing in size or showing much ability to heal the wound. The fruit on branches judiciously girdled grows much larger and ripens earlier than that on branches which are not girdled. Except in the hands of the skillful horticulturist this girdling is a dangerous practice, since the parts below the girdle are not properly nourished.

If no growth can take place until the sap supplying it is digested in the leaves, the question naturally arises, how does a deciduous tree start into growth, and in some cases put out its flowers before its leaves form in spring. The tree provides for this emergency by digesting and storing up abundant food supply before it sheds its leaves in autumn. This food supply is stored up mainly in the form of starch, and is particularly abundant near the buds of the new twigs. Some species store up a great quantity of it at the crown, just below ground, and are thus enabled to throw up sprouts from below ground in case the main plant is eaten off by animals or injured in any way. Sometimes the roots become very fleshy with this store of nutriment. The ability of a tree to leaf out more than once in spring, providing its first crop of leaves are destroyed by insects or by frosts, depends very largely upon the abundance of this reserve supply of digested food. As a rule a tree exhausts this food supply by the time, or even before it comes into full leaf. As soon as new, green leaves are formed they begin to digest food for their own growth and the growth of the tree. If the leaves are stripped from a tree in midsummer it is not likely to have a sufficient reserve supply of food to leaf out and become sufficiently well nourished to pass the winter and put out again the next spring. If it is defoliated in very early spring it usually has sufficient food supply to recover and live. It will be seen, however, that it is

highly important that the leaves should be kept in a healthy, growing condition, and that injury to them weakens the tree.

The fact that the removal of healthy leaves, in summer, has a weakening effect, should govern, in a measure, our methods of pruning. It is a well known fact among horticulturists that pruning in winter favors vigorous wood growth and that pruning in summer opposes vigorous growth. This has given rise to the familiar maxims "prune in winter for wood and in summer for fruit." The somewhat weakening effect of summer pruning (which removes leaves) is likely (in common with any other practice that slightly checks wood growth) to stimulate in the tree an abundant setting of fruit buds. If a part of the branches of a tree are removed in winter, the large supply of starch stored up in the roots and trunk has a smaller number of buds left to push into growth in spring, consequently each bud receives a greater supply. After growth starts, the large root system also applies its unabated energies to fewer branches and they are stimulated into utilizing a greater amount of sap, and consequently into more rapid wood growth.

A wound heals by the growing layer lapping over and covering it. Since this covering for the wound is produced by food brought down from the leaves, between the bark and sap wood, wounds heal most rapidly from above, downward. If the top of a small tree is cut back, it should be cut just above, and sloping downward away from a bud. If the part cut away has branches, the cut should be made just above a branch, so the leaves of this branch may digest and bring down the nourishment to cause the healing of the wound.

Different methods of cutting trees and branches on the station grounds last year show that where a bare stub is left above a bud or branch, the end of this stub will not heal over, while if there is a growing branch just at the wound, this branch will afford the material for quickly healing the wound. In removing a side branch, if a knot or stub is left it will not heal over until the tree has increased in diameter sufficiently to lap over it. It is best then to cut the branch well in, so the growing layer of the trunk can quickly begin to cover the wound. A branch usually has a bulge where it joins the main tree. Hence cut close to the tree the wound will be larger than if cut a little way out, and at right angles to the branch. Repeated trials last summer showed that the larger wounds made by cutting close to the trunk, healed most rapidly.

J. C. WHITTEN, Columbia, Mo.

DISCUSSION.

Secretary Dunlap—Everyone here is a horticulturist or a consumer of horticultural products. I will call your attention to something for you to think about. I noticed it in going about the state of Illinois last fall. I found some apples very much inferior to others in quality. In some orchards the apples were only half-size. In other orchards the outside rows had nice apples, while the inside trees bore very inferior fruit. In early days shelter belts were considered necessary. My father planted a shelter-belt of soft maple about two rods in width. There was never any fruit upon those trees to amount to anything. Last year I saw an orchard with protection, but with a break through which the wind swept. The protected part had no fruit while the open part had plenty. Close planting will make your orchard a continuous shelter. Such orchards don't have proper air drainage. I know a man in Illinois who set his trees 16 feet apart each way. I think he promised to thin them out when they began to get too thick, though he never did it. It is like the promises of politicians before election day. I think it is better to set your trees as far apart as you wish them to be when they are 25 years old.

I invite you to attend the meeting of the Illinois society, between Christmas and New Years' day.

Mr. Reed of Wisconsin—I think it would be a good thing if those persons who read papers before such associations as this would bring duplicate copies, for the reporters of the press are always glad to get them and their publication would give you enough free advertising to pay you for making the copies.

THE POSSIBILITIES OF THE OZARK HILLS, AS REGARDS THEIR ADAPTATION TO SUCCESSFUL FRUIT CULTURE.

The Ozark region is not strictly speaking a mountainous country; the Ozark mountains, so called, being in general merely an elevated plateau, in fact wanting most of the district characteristics that distinguish real mountains. The table lands of the Ozark rarely exceed 1,600 in height. These elevated lands situated in Southwest Missouri and Northwest Arkansas may be estimated to embrace an area of about 40,000 square mile. More than one-third of this area, at least 10,000,000 acres remain unimproved, producing little revenue to the State and less to the owner.



ORCHARDS ON THE MISSOURI HILLS.

These high lands are not as a whole attractive to the eye of the agriculturist; much of the surface is too rolling and broken for extensive farming.

In the interest of the State of Missouri and Arkansas, and especially in the interest of horticulture, the question remains to be answered, can these ten to twelve million acres of rough, rocky, unimproved lands be profitably utilized in the cultivation of fruits for the markets of the world? Before giving a final answer to this question let us briefly enumerate some of the peculiar advantages that this region possesses and state why it is thought that these lands have all the essential elements necessary to constitute a favorable location for successful and profitable fruit culture.

These lands have the requisite climate and temperature, as they are located geographically between 35° and 39° north latitude.

We find that they are in the same latitude as the famous fruit districts of Central and Southern California, more than 3° south of the most southern point of Italy and many degrees south of the vine-clad hill of the German Rhine.

These points are mentioned in comparing their location with the Ozark region because they are each in their way celebrated for their fruits. Every country has its specialities; even the Arctic regions produce seals, furs and feathers in abundance; stony Arabia produces more than 100 varieties of the date palm and perhaps the best coffee in the world.

The sandy, almost desert lands along the coast of Florida, produce oranges, lemons and other semi-tropical fruits in abundance. The soil about Los Angeles and Fresno, California, where citrons and vinous fruits arrive at such high perfection is so sandy that it is unfit for general agriculture. The Ozark hills, although lying in the same latitude with California, will not produce successfully all the tropical fruits, because the conditions are dissimilar; their elevation is greater than the coast of Southern California, and unlike it they have no large body of warm water near to modify the temperature. The horticulturist here must per force content himself with the fruits and vegetables indigenous to the south temperate zone.

There are some peculiar advantages that may be considered here that are of especial benefit to the fruit-raiser in the Ozark hills. Lying well south they have long seasons of warmth, while their moderate elevation tempers the fierce rays of the sun in the heated season and prevents premature development of vegetation in the spring; this fact, taken in connection with that other, that these lands are surrounded by valleys on all sides, by the Arkansas and its tributary val-

leys on the south and west, and by the great Missouri and Mississippi valleys on the north and south. These two conditions combined constitute an essential element in climate and temperature to the horticulturist, in this, that the warm air rising from the surrounding valleys and wafted by the winds that inequalities of the earth's surface always create, these moist, warm ascending vapors from the lower bottoms incline to spread out as they rise, enveloping the higher grounds and contribute in securing immunity from untimely frosts. Admitting these claims to be well founded, the climatic condition of the Ozarks is favorable to horticulture.

We now come to consider the soil and its adaptability to fruit culture.

It may be questioned if these gravelly hillsides and rocky ridges possess sufficient fertility and the soil contains the necessary elements to grow fruit in paying quantities.

We may say to the doubting: Look! see the record of nature impressed in indellible lines upon the hillsides and on to the hilltops, up even to the highest range. Behold the great variety of forest trees with stout, spreading branches, sturdy trunks and great roots thrust deep through the gravelly surface far down into the red marley sub-soil below. These trees cover the sides and crown the summits of the highest ridges; below them grow numerous species of shrubs, grasses, plants and flowers, also, several varieties of native grapes, some tiny and so dwarfed that they could be potted for house plants, others of enormous size climb to the top of the highest trees, embracing their trunks and embowering their branches.

With this record before us who will deny that nature has decreed that berries, grapes and the larger fruits will grow abundantly on these wooded hills when men with willing minds and strong arms sweep off the forest growth, break up the soil, plant, protect and nourish these good gifts of the Bountiful Creator.

In conclusion it may be interesting to state some facts that observation and experience have taught us in regard to what has already been accomplished in fruit-growing on the broken lands. It may also be useful to point out instances where mistakes have been made, as we learn wisdom, or should do so, by our failures. It was a mistake in the early settler to plant his best wheat and corn lands in his narrow hollow in orchard when he had plenty of rough land near that was better fruit land. Again it was a great mistake to plant apple trees and pasture the land without cultivation; the stock had the best chance of growth in the arrangement. But men that have planted rough lands to orchards and given them proper care and intelligent cultivation

have been amply paid for their investment. Numerous parties have sold their fruit for more from a few acres than their farms were valued at by the assessor. The fine, gravelly soil with rich red clay subsoil so common to the Ozark mountains produces all the fruits indigenous to the temperate zone with less care, more certainty, of larger size, higher color, and richer flavor than any other part of the world. The more than 10,000,000 acres of unimproved lands of the Ozark range suitable for commercial fruit farms will in the near future fill and control the markets of the world.

GEO. BILL, Bentonville, Ark.

ON OBITUARY.

Whereas, Since the last meeting of the Missouri State Horticultural Society our brother and friend, W. N. Sewall of Carthage, Jasper county, Missouri, has rested from his labors and passed to the beyond to enjoy the rewards of a well-spent life. It again becomes the duty of our Society to set apart a page of its minutes to the memory of one of our faithful members. Brother Sewall was born in Jacksonville, Ill., February 11, 1832, and passed away at his home in Carthage on the 29th day of September, 1897, having reached the age of 65 years and 7 months.

He came to Missouri in 1885, since which time he has followed the pursuit of horticulture, and by his upright life and untiring energy held a prominent place among the business men of his community. Brother Sewall early in life united with the Presbyterian church, of which he was a consistent member until his death.

The deceased was a most devoted and loving husband and father, and the welfare of others was always uppermost in his thoughts, proving that his life was not lived for himself alone, but found its satisfaction in ministering to those around him; therefore, be it

Resolved, That in the death of Brother Sewall the Missouri State Horticultural Society has lost one of its most faithful and worthy members.

Resolved, That these resolutions be placed upon the minutes and a copy of the same be forwarded by the Secretary to his family, with whom we sincerely sympathize in their sad bereavement.

HENRY SCHNELL,
A. NELSON,
F. H. SPEAKMAN,
Committee.

REPORT OF AWARDING COMMITTEE—SPECIAL MENTION.

Your committee wish to call the attention of the Society to the following exhibits, which we think of interest and importance to the fruit-grower: Among the most promising seedling apples we notice one presented by Mr. A. Nelson, fair size, bright red apple; quality very fair; indicates good keeper.

Mr. C. C. Bell presents one seedling; resembles the York Imperial in shape and color; perhaps not so good keeper as York Imperial.

Same party presents a yellow sweet apple, good size and good-quality. We are favorably impressed with this last specimen. We also believe all these varieties are worthy of trial.

The Experimental Station of Columbia University have on exhibition two dozen jars of grapes, mainly new and promising varieties; 50 varieties of new seedling strawberries, originated by said station; 10 varieties of cherries; also apples and other fruits, showing the value of the different strengths of formalins used in the preserving of such fruits. This process indicates a very successful method of preserving fruits in their natural appearance.

J. W. STANTON, Chairman, Richview, Ill.

FAREWELL.

Mr. Barnes of Kansas—I have had great pleasure in meeting with you. I will meet again with you whenever duty does not call me elsewhere. I again invite you to come over the line to the Kansas meeting.

President Evans—On behalf of the horticulturists I again thank the people of Moberly for the way they have treated us. We have had a large attendance, good order, and we are going away well pleased.

Motion to adjourn by Sam'l Miller. Carried.

THE SAN JOSE SCALE IN MISSOURI.

(*Aspidiotus perniciosus*, Comst.)

SUMMARY OF RESULTS.

The investigations and experiments conducted by this Station during the past two years on the San Jose scale have given results which are briefly summarized as follows:

I. The San Jose scale has been found infesting twenty private orchards in Missouri, some of which are already completely ruined, while others have only part of the trees beyond recovery, provided they be attended to at once.

II. Thirty suspected private orchards have not yet been inspected, and it is probable that some of these will be found to be infested, thus swelling the number of infested orchards beyond the twenty now known.

III. The scale has not been found infesting any nurseries within this State, although two nurseries have infested orchards within one half mile.

IV. In every known case the infection was introduced, unconsciously, on nursery stock from one or the other of two New Jersey nurseries with one exception, and that came from Pennsylvania.

V. While in most cases the scale was introduced from four to seven years ago, one infection was introduced but two years ago.

VI. The San Jose scale is distributed easily on nursery stock, cuttings, cions, buds, etc.; and naturally spreads from tree to tree and from orchard to orchard by birds and insects.

VII. In some localities in Missouri not only orchard fruit trees, but shade and ornamental trees, osage orange hedges and some forest trees are now infested as a result of the natural distribution of the insect from the infested orchards.

VIII. The San Jose scale can best be killed in orchards by the use of whale-oil soap. The tree should first be severely pruned and then thoroughly washed or sprayed on all sides with two pounds of whale-oil soap dissolved in one gallon of hot water. At least two applications are necessary and three are preferable. The first application should be made shortly after the leaves have fallen, the second some time during the winter and the third in the spring before the buds swell. If only two applications can be made, the first and third are to be used—namely, the fall and spring applications. Hydrocyanic acid gas is practically the only other safe remedy, but this is more troublesome and expensive than the whale-oil soap method except for nursery stock.

IX. Spray pumps to be used for the application of hot whale-oil soap should have metal valve, since the soap destroys leather and rubber rapidly.

X. Do not be deceived and try to kill the San Jose scale during the summer by the use of ordinary insecticides, such as kerosene emulsion, etc. Use whale-oil soap, and use it only during the dormant state of the tree.

GENERAL DISCUSSION.

Two years ago the Department of Entomology of the Missouri Agricultural Experiment Station was established, and one of the first investigations undertaken was in reference to the San Jose scale, which up to that time had not been observed within the State limits, but which from its importance justified immediate attention, especially since it was being found in states east of us.

Since nurseries are the source from which the greatest danger could come, the principal nurseries were visited and inspected, together with some of the larger commercial orchards. The result showed that at least the nurseries of Missouri were probably free from this dreaded insect pest, while one private orchard was found to be infested. But since the inspection of private orchards throughout the State would be an expensive and tedious operation, it was thought best to issue a circular of information in regard to the San Jose scale;

and to distribute it to the horticulturists with the hope that by calling attention to the damage that would result from the presence of this insect, and by describing and illustrating it people owning infested trees would recognize it and take means to exterminate the same, and inform the station of the infection. Strange as it may seem, not a single infection was reported as a direct result of the circular; but incidentally through correspondence this station located three private orchards that were badly infested.

Having thus proven the presence of the San Jose scale within Missouri, and having traced the source of the infection to two New Jersey nurseries, these two nurseries were asked to furnish a list of Missouri customers to whom nursery stock had been shipped during the time their nurseries were, unknown to them at the time, infested. They kindly complied with the request, which resulted in three hundred and ten names. Circular letters were then mailed to each person, and the reports received were culled in order to separate the more probable infested localities, and lessen the time and expense of a personal inspection. The Legislature having failed to appropriate funds (\$1,000 was asked for) for the San Jose scale investigation and extermination, the State Horticultural Society gave \$200 toward the work. The suspected orchards were therefore inspected as far as the funds at our command would permit, and as a result of the inspection twenty private orchards were found to be infested, while thirty suspected orchards remain uninspected, which, if they could be visited, would, no doubt, add to the list of those already known.

Some of the infested orchards are now completely ruined, while others may be saved in part provided immediate and strenuous efforts be made to exterminate the scale. In the majority of infested localities the scale can now be exterminated for a comparatively small sum of money; but in other places the insect has spread over such a wide area, and infests so many ornamental, shade and forest trees, as well as fruit trees and bushes, that unless the Legislature at once appropriate several thousand dollars for the work of extermination, the San Jose scale will always be with us, for in many places it is now beyond private control.

The exact localities of the infected orchards are as follows:

Marshfield, Webster county, Missouri, one family orchard.

Norborne, Carroll county, Missouri, one orchard $2\frac{1}{2}$ miles south.

Jefferson City, Cole county, Missouri, two orchards 2 miles west and one orchard 4 miles west.

Cape Girardeau, Cape Girardeau county, Missouri, one orchard 1 mile west.

Normandy, St. Louis county, Missouri, several orchards and small fruit farms.

Des Peres, St. Louis county, Missouri, two orchards.

Afton, St. Louis county, Missouri, two orchards.

Moberly, Randolph county, Missouri, five private orchards in city and two east of city limits.

Blue Springs, Jackson county, Missouri, two orchards, one within city limits and one just without.

Independence, Jackson county, Missouri, one orchard 1 mile east, one orchard 3 miles south, and one orchard $2\frac{1}{2}$ miles south.

Missouri horticulture will suffer many million dollars loss in the near future unless every effort, both private and legislative, be at once made to exterminate this scale in the areas now infested, and to prevent its introduction into new localities. Each year that this matter is neglected greatly increases the difficulty and expense necessary to eradicate it, enlarges the infested area and renders some new locality beyond control. No one can form an idea of the importance of this pest until they have seen an infested orchard—the damage done, the trouble and difficulty to kill the insect, and the impossibility experienced by the ordinary observer to detect its presence unless it occur in vast numbers, which indicates that it has probably already spread over a considerable area.

Missouri ranks third among the states in its horticultural interests. Many states whose fruit is a small item compared with Missouri's, have already made appropriations for the investigation and extermination of the San Jose scale, and have enacted laws to prevent the introduction and spread of the pest. Missouri should have been one of the first to provide for its fruit interest in this respect, and it is to be hoped that every fruit-grower and every intelligent person in the State, will demand that our next Legislature provide for this important work. Ample funds should be provided with which to carry on the investigation and work of extermination; and laws should be enacted to compel owners of infested plants to make immediate efforts to eradicate the pest, or submit to having it done; and also laws enacted to regulate the sale and distribution of infested nursery stock within the State. As it now stands, any infested nursery can ship its stock into Missouri.

The full description of this insect and its remedies, with illustrations, can be found in the State Horticultural report for 1896.

REMEDIES.

It is impossible to discuss in this bulletin the merits of the different washes and remedies used against this insect. It will suffice to give the following, which has been found to be the simplest and most effectual :

Cut down and burn all badly infested trees, since they are already so far gone and injured that it will not pay to try and save them. Prune the other trees back severely and burn the cuttings. Then apply thoroughly, by means of a force pump and spray nozzle, or by a whitewash brush, or both, as the case may require, whale-oil soap, dissolved in water in the proportion of two pounds of soap to one gallon of water. Give the trees a good drenching on all sides so as to completely cover every portion of the tree above ground, and repeat the process if it rains within a week after the spraying. Three applications should be made, and two are absolutely essential.

The best time to apply the soap is in the fall, just after the leaves have fallen, and before the scales have become hardened, and again in the spring, just before the buds swell, and if possible, once during the winter also. If but two applications can be made, the fall and spring applications are the essential ones.

Do not use whale-oil soap for San Jose scale while the trees are active or leaved out, since it is apt to kill them.

The use of washes during the summer is of practically no economic value, since the young lice are hatching continuously. This would necessitate sprayings every third day for two months. The expense of such a treatment would be too great. The young San Jose scale, not over two days old, is easily killed by ordinary washes, and if it were not for the continual appearance of the same, the insect would not be especially troublesome.

Old trees and all others that have rough, scaly bark should be cut down and burned if infested with the scale, since it is impossible to reach and kill the scales that are protected under such rough bark.

Be sure and use whale-oil soap and not ordinary soap. If whale-oil soap cannot be had, fish oil soap can be used, but not with as good results. Whale-oil soap can be purchased from any large drug firm. It costs about four cents per pound.

The only objection to the application of this wash is that the trees are liable to either not bloom at all or to bloom very little the first season, but they will make up in an increased development of foliage and vigorous growth of the tree.

From our experiments in Missouri it is evident that whale-oil soap used as directed will completely exterminate the San Jose scale on the trees thus treated.

Nursery stock that is infested with the San Jose scale should be burned; while stock that might possibly be slightly infested by being grown near (one mile or less) regions that are infested, should be fumigated as a precaution, even though no scales are detected on such stock. The nature of the scale renders it impossible to make a complete inspection and detection of the pest in nursery stock, and hence the necessity of a thorough fumigation. The fumigation should consist of hydrocyanic acid gas generated in a tightly closed box or room in which the stock is placed.

The following is a reliable plan: Select or have made a tight room or large box and place the nursery stock in it, filling it up if necessary, and then generate the hydrocyanic acid gas by placing it in an earthen bowl, two parts sulphuric acid mixed with six parts water, put this in the box or room, and when all is ready, drop one part cyanide of potassium in the bowl of weak acid and close the door immediately. Of course the door should fit tightly so that no gas (to amount to anything) can escape. Every precaution should be taken not to breathe the gas, since it is extremely poisonous. Leave the plants under the influence of the gas for one-half to three-quarters of an hour.

The proper amount of the ingredients required, depends on the size of the room or box, but it is safe to say that one ounce of the cyanide of potassium should be used for every 150 cubic feet of the room space. For instance, a room ten feet by ten feet by six feet would contain 600 cubic feet, and after the nursery stock is in, the bowl should be supplied with eight ounces of sulphuric acid and twenty-four ounces of water stirred together, and when all is ready, four ounces of cyanide of potassium should be added.

Open and air the room before entering to remove the plants.

We are indebted to the following railroads for material assistance in carrying on the work of inspecting orchards: Kansas City, Fort Scott & Memphis R. R. Co., St. Louis & San Francisco R. R. Co., Hannibal & St. Joseph R. R. Co., St. Louis Keokuk & Northwestern R. R. Co., Kansas City, St. Joseph & Council Bluffs R. R. Co. and the Chicago, Burlington & Kansas City R. R. Co.

J. M. STEDMAN, Entomologist, Columbia, Mo.

THIRD LIST OF HORTICULTURAL QUESTIONS.

1. What fruits can the fruit-grower in Missouri have on the market in May ?

Strawberries, early raspberries and some cherries, both sweet and sour.

2. What out door vegetables can be placed on the market in April and May ?

Radishes, lettuce, spinach and onions.

3. What effect does fruit as a principal food have on the disposition of men ?

Ripe, fresh fruit, by stimulating the appetite, aiding digestion, and promoting the general health, tends to render the disposition mild and peaceable. *Fruits* and *farinas* are our natural and most healthful food.

4. What is pomology ?

Pomology means "the art or science of fruit-raising."

5. How does it differ from horticulture ?

It differs from horticulture in the fact that it has nothing to do with methods of culture. Horticulture includes pomology.

6. What are evergreen-trees, and how can they be utilized ?

Evergreen-trees are those which retain their leaves at all seasons of the year. They may be utilized as hedges, screens and windbreaks, also in ornamental planting.

7. What are the objections to too many shade trees near a dwelling ?

They cause ground and walls to retain too much moisture and keep out the light.

8. What is an insectivorous plant ? Mention some.

Such plants as derive nutriment from insects which are caught by the sticky, glandular hairs of the plant ; or such as the fly-bane or "catch-fly," or the sensitive plant known as the Venus' fly-trap.

9. How and where should a limb be cut from a tree ?

Just outside the protuberance seen on the juncture of the limb and body of tree, nature's own gage or mark, as where a limb should be cut off with a sharp knife.

10. What is meant by a tree bleeding ?

The running of the sap after trimming.

The flow of sap in trees corresponds somewhat with the circulation of blood in the human body, and a cut or wound made by severe

pruning or topping a tree or grapevine during the flow of sap in early spring may cause it to bleed to death.

11. Prove that sap is not conducted to the branches through the hard or heart wood.

By coloring the water with which a plant was watered, it has been traced within the stem and found to ascend almost wholly in the cambium layer (alburnum) or young growing wood between the bark and heart wood. The same may be proved by sawing and placing a stick of hickory or maple in the sunshine, or on a fire in early spring and witnessing the flow of sap from this layer.

12. Can small plants and trees be sent by mail?

Yes, safely, to the amount of four pounds.

13. What duty do the local Horticultural Societies owe to the public schools and grounds?

They should aid in selecting and procuring suitable trees and shrubs for school grounds.

14. What is Arbor day?

The Friday following the annual school meeting is a day set apart for cleaning up and arranging grounds in every school district, when parents and guardians are expected to assist in planting suitable shade and ornamental trees and encourage the work by appropriate talks?

15. What are deciduous trees?

A deciduous tree is one that drops its leaves in autumn?

16. What are perennials?

Perennial plants live and blossom year after year.

17. What are annuals?

Annuals live only for a year or part of a year.

18. What is meant by nomenclature in horticulture?

By nomenclature in horticulture is meant the correct naming of varieties of cultivated garden plants, including vegetables and fruits.

19. What is sun-scald?

Sun-scald is the burning of tender leaves or the bark of trees by the hot sun.

20. How prevented?

It is prevented by keeping the parts shaded by proper pruning or wrapping.

21. What kind of a branch is called a sucker?

One that starts from the underground stem.

22. What three ways of propagating currants?

(1) Grafting; (2) layering; (3) from cuttings.

23. What is "bagging" fruit ?

"Bagging" the grape—the only fruit bagged that I know of—is a method of inclosing the fruit cluster within a paper bag, soon after blooming, as a preventive of rot. One-pound manila paper bags are recommended. "Bagging the grape" not only prevents rot but makes the fruit more beautiful. Recommended only where but few vines are grown.

24. What is a trellis ?

A trellis is a structure of cross-barred or lattice-work, or of posts driven into the ground with wires attached and extended from post to post, and used as a support or protection for grape and other vines.

25. Why prune trees ?

Trees are pruned (*a*) to direct the growth and to preserve a symmetrical form ; (*b*) to prevent overcrowding of branches, so as to admit the sunlight and to facilitate spraying and picking of the fruit ; (*c*) to remove dead or decaying branches ; (*d*) in some cases to thin the fruit ; (*e*) in some cases to induce fruitfulness.

26. When prune trees ?

Late in winter or early spring is the best time, except when it is desired to check the growth, so as to favor the formation of fruit buds. In that case summer pruning is resorted to.

27. How prune trees ?

(*a*) With a jack-knife cut away such small branches on young trees as are likely to crowd when they grow larger, and in many cases rubbing off young sprouts answers the same purpose ; (*b*) with a saw which will make a smooth cut, one in the form of a meat saw, with a stiff back, is better than the common pruning saw with two edges ; (*c*) pruning shears are often useful. In all cases where a limb is to be removed entire, the cut should be made just at the collar, so that the wound will heal quickly. When limbs are to be shortened, it is advisable to make the cut near a branch, as if a stub is left the wound will not heal.

28. What two methods of growing strawberries ?

(*a*) The hill method, by which the runners are cut from the plants and no new plants allowed to take root ; (*b*) the matted row system, by which the runners are allowed, with more or less restriction, to grow and take root.

29. What is cold storage ?

Cold storage is the process by which perishable articles are kept at a low temperature, a little above freezing, in most cases, in order to prevent decay.

30. Why does cold storage preserve fruit ?

Cold storage preserves fruit because the chemical processes which take place in the ripening of fruit go on very slowly in a low temperature, and because the fungi which induce decay do not thrive under such conditions.

31. What is meant by small fruits ?

By small fruits we mean esculent berries of every kind, such as strawberries, raspberries, blackberries, gooseberries, currants, and some include grapes.

32. What is meant by stone fruits ?

Stone fruits are such as have a kernel inclosed in a hard covering or shell enveloped in the pulp, such as peaches, plums and cherries.

33. How distinguish crab apples from other apples ?

Primarily, a crab means a wild apple, so called from its rough taste. Improved by cultivation, trees are less scrubby, fruit larger in size, though smaller and more acid than other apples, generally.

34. What uses are made of crab apples ?

Chiefly used for cider, vinegar, preserves, jelly and for ornament, although some improved sorts are very good to eat.

35. How can a tree cut down in winter leaf out without the aid of its roots ?

By using the starch which was stored up around the buds while the leaves were on last summer. The heat stimulates growth, and this starch supply is used.

36. How can a twig cut from a plum tree in winter and put in water in a warm room flower ?

Same as above; the starch around the buds feeds the new growth.

37. How can a twig be forced into growth in the winter by drawing it in a warm room while its roots are frozen outside ?

Same as above.

38. Why will some trees leaf out again if their leaves are killed in early spring while they will not if their leaves are killed in mid-summer ?

In early spring the starch which was stored up for winter is not yet exhausted, and can nourish a second crop of leaves. In midsummer this starch is all gone, and if the leaves (which digest food to nourish growth) are killed, there is no starch left to promote growth.

39. Why are potatoes propagated from tubers while tomatoes are propagated from seed ?

Potatoes come true from tubers, but every seed will produce a different variety, most of them being poorer than the parent. Tomatoes come true from seed.

40. Why will the seed of a Ponderosa tomato produce a Ponderosa tomato, while the seed of a potato will not produce potatoes like its parent?

The reason is, potatoes have not had their seeds selected to fix the type; tomatoes have.

41. Do pine trees have flowers? If so, when do they flower?

Yes; they flower in May.

42. Do oak trees bear seeds? Do they bear flowers?

They do, and also flowers. The acorns are the seeds; the flowers appear just as the leaves are starting.

43. Do willows have seeds?

Yes.

44. How do willow trees propagate themselves so rapidly on sand bars?

By their twigs, which are brittle, breaking off by winds or when loaded with snow and ice, and floating down to sand bars, where they root as cuttings. They also propagate by seeds.

45. Does the white elm have seeds? If so, when do they ripen?

Yes. They ripen in April, before leaves appear.

46. When do ash seeds ripen?

In autumn.

47. How are Kentucky coffee beans and locust seed treated to make them germinate?

By pouring boiling water over them and allowing them to soak until they swell.

48. Why are the roots of forced pie plant and asparagus unfit for further use?

Their strength is spent in forcing.

49. Where are the famous fields of celery?

In Michigan and Wisconsin.

50. What are citrus fruit, and mention some?

Lemon, citron, orange, bergamott, lime, etc.

51. Where and how are cranberries raised?

They are raised in swampy land in Michigan, in Canada, and several northern states.

52. What is a bud?

That from which a stem with its leaves is continued or a new stem originated is a bud—Grays Botany.

53. What is the difference between the fruit and the seed?

The fruit is the seed vessel. Practically it may include such parts as the calyx, receptacle, etc.—Gray.

The seed is the final product of the flower, and has the rudimentary plant in it.

54. What is meant by berry ?

A berry is a fruit in which the flesh is soft throughout, with the seeds imbedded, such as gooseberry, strawberry, blackberry, tomato and orange.

55. What is chlorophyll ?

The green grains within the cells of plants.

56. What is protoplasm ?

Protoplasm is a peculiar semi-transparent substance invariably present where life, plant or animal exists.

57. What is a layer ?

A layer is a branch of a raspberry, etc., which is bent down and covered with soil for the purpose of growing a root, after which the connecting branch is cut, and so a new plant is originated.

59. What is a sport ?

A bud or shoot which suddenly assumes characters different from the rest of the plant.

60. What is cambium and its office ?

The formative fluid found in the layer between the bark and wood of an exogenous stem.

61. What is the difference between pumpkin and squash ?

They are different species of the same genus cucurbita of the family cucurbitaceae.

62. What is vegetable respiration ?

Vegetable respiration is taking of air, gases and nutriment through the leaves.

63. What is vegetable assimilation ?

Assimilation is the conversion of the transferred nutriment into the substance of the plant itself.

64. In speaking of cells in plants, what do we mean ?

A typical cell is an oval body having a thin membranous wall surrounding the protoplasm and nucleus. All living organisms are composed of one or more such structures—McMurrick.

65. What is reproduction in plants ?

Reproduction of plants means the natural multiplication by seeds and other means.

66. What are exogenous stems ?

Exogenous means outside growing. That is, the new wood is added on the outside of the old, though within the bark.

67. What are endogenous stems?

Endogenous, or inside growing, the woody threads are evenly distributed throughout the stems, not in layers.

68. What countries teach horticulture in their public schools?

Some places in America, Prussia, Belgium, Germany and Russia.

The following resolution was passed by the Missouri State Teachers' Association, and may lead to some definite plan for future work:

That this Association would look with favor upon the enactment of a law requiring that the elements of science, of agriculture and horticulture be included among the subjects to be taught in the public schools of Missouri; also, the President of the Association shall appoint a committee of three to investigate and report at our next annual meeting what is being done by the Missouri State Horticultural Society in the matter of horticultural education, that we may co-operate with it if favorably impressed.

G. B. LAMM,
Chairman Com. on Hort. Education, Sedalia, Mo.

COMPARATIVE PHENOLOGICAL NOTES.

The taking of phenological notes upon the various phases of plant development has received comparatively little attention, especially in this country. Among the earliest records are those by Stillingfleet in England, who, during the latter part of the last century and the beginning of the present, noted the appearance of flowers on quite a large number of plants, covering a period of thirty-two successive years. The Royal Meteorological Society of Great Britain has carried on similar work for many years at various stations. The only published records in this country appear to be those by Britton* on the fall and appearance of leaves at New Dorp, Staten Island for the autumn of 1877 and spring of 1878; Henry†, on the appearance of leaves for the spring of 1881, at Madison, Wis.; Trelease‡ on the appearance and fall of leaves for 1883, 1884 and 1885, at the same place; Holsted|| on the appearance of flowers for the spring of 1886, at Ames, Ia.; Baily¶ on the leafing seasons for 1885, 1886 and 1887, at Lansing, Mich.; Pammel§ on the appearance of flowers for 1891, at Ames, making comparisons with Holsted's notes at the same place for 1886; Pammel** in the same manner for 1892, making comparisons with notes from Madison, Lansing, New York and Vienna, Austria; Whitten†† on the beginning and ending of the leafing, flowering and fruiting season for 1892 and 1893, at the Missouri Botanical Garden, St. Louis.

While these records are not sufficiently complete for the greatest good, they are useful in many ways. Concerning the value of a knowledge of the time when leaves fall, Prof. Trelease, in the report above referred to, says: "It is of value for a correct understanding of their vital processes." Prof. Bailey says, "it is invaluable in determining the varying periods of growth in different latitudes and under varying conditions." Furthermore the horticulturist is interested, insofar as it bears upon plants of horticultural value, a knowledge of the flowering season is essential in planting to secure succession of bloom from very early spring to late autumn. Again he must know the leafing

*Bull. Terry. Bot. Club, 6:211, 235; 1878.

†Rep. University of Wisconsin, 35; 1880.

‡Rep. Wisconsin Agr. Exp. Sta., 1:56; 1883—2:56; 1885.

§Bull. Iowa Agr. Col., Dept. of Botany, 42, 1886.

||Bull. Michigan Agr. Col., 31:67; 1887.

•Bull. Torrey Bot. Club, 19:375; 1892.

*Proc. Iowa Acad. of Sciences, 46, 1892.

†Rept. Missouri Bot. Garden, 5:123; 1894.

season so as to select and properly arrange those whose buds are first to open in reference to those which hold their foliage longest.

While these notes are useful for the reasons first given, there is another even more interesting, and which may become useful—namely, the relation they bear to existing meteorological conditions. All plants are influenced in one way or another and to a greater or less extent by the immediate past and current meteorological conditions. Waldo, in his work on modern meteorology, refers to the works of a number of European meteorologists and others, some of whom have endeavored to deduce a formula that will indicate the influence which temperature bears upon the phenomena of plant development. It cannot be said that their attempts were by any means a success, largely because of incomplete data, together with the fact that other conditions than temperature play an essential part. Though temperature is evidently the most important factor, frequency and amount of rainfall, velocity of wind, amount of sunshine, together with the character and meteorology of the soil must be considered. Moreover the phenology of the plants must include separate notes on each one of several individuals of a species in various exposures in the same as well as different latitudes and extending over a series of years upon the same individuals. As no such records exist, it is impossible to arrive at any very definite conclusions.

It would seem that our Experiment Stations might do valuable work along this line by deciding upon a list of representative species on which observations be made by responsible persons, who could be trusted to take accurate and complete notes. With these brought together from all parts of the country and properly tabulated a phenological chart might be made which would indicate the approximate time of the various phases of plant development for the different localities, and this would be of incalculable assistance, especially to working botanists; also, if accurate meteorological observations be made at the same places its influence might be determined, at least their relationship could be indicated. It would also be well to calculate the relative absorbing and evaporating power of the different species under consideration by laboratory experiments.

In the absence of more complete data, the following tables, giving dates of the appearance of flowers, are compiled from records taken at the Missouri Botanical Garden from 1892 to 1897; Manhattan, Kan., from 1894 to 1897, and Ames, Ia., during 1886, 1891, 1892 and 1896.

As above mentioned, some of these notes have previously been published, and for those which have not I am indebted to Prof. G. W. Carver for those from Ames for 1896, and to Mr. J. B. S. Norton for

all from Manhattan. Those from the Missouri Botanical Garden for 1894 were taken by Prof. J. C. Whitten and Mr. E. Mische, at that time a garden pupil; the others by the writer, with the assistance of many of the garden pupils.

To illustrate the annual variations in the time of flowering, the appended diagrams (plates 1-3) were designed. The vertical lines represent the years, and the horizontal dotted lines every second day beginning with the earliest date of flowering. A few plants from the Missouri botanical garden list were selected for plate 1, and from Manhattan and Ames for the two following plates respectively. Knowing the date that each plant blossomed during the different years of the period, curved lines are drawn through points where the lines representing these dates intersect, and the name of the plant placed at the end of the line. The direction of the line not only gives the actual time for each year, but shows the yearly as well as extreme variation that each plant reaches during the entire period. It will be observed that the variation is much greater with some plants than with others, showing that some respond more quickly to certain climatic conditions. Again, one plant may blossom earlier than another one season and later the following season. Take for example, *Forsythie viridissima* and *Dirca palustris*. In 1895 the former appeared thirteen days later than the latter, whereas in 1896 the former was seven days earlier than the other. For these apparent inconsistencies it is very difficult to find a reason. However, it seems to show that numerous elements must more or less influence growth, and to find a reason each must be analyzed.

Temperature tables for St. Louis and Manhattan, including mean temperature for each day from February 1 to May 31 with the sums and means for every 10 days as well as for each month, are given, together with diagrams (plate 4) showing variations in the same manner as the plant variations are indicated.

The solid curved lines in this diagram represents the average temperature from the first to the tenth, the eleventh to the twentieth and the twenty-first to the last day of each month, and the dotted lines represent the average temperature for each month. These months are selected on the supposition that they exert more direct influence than any other time. It will be observed that in a general way the lower the average temperature during these months the following season is correspondingly late. Beyond this it is impossible to go with present data. Other things being constant it would seem that each plant required a certain amount of heat to bring it to a certain stage, and by computing the sums of the daily averages from a certain date, the time of flowering, etc., could be determined from weather records.

This is not improbable when we know the influence which other elements exert. As it is impossible to say just when a plant begins to be influenced by the temperature, it would be necessary to reckon from the observed time of one of the earliest to appear.

A table is also included, comparing various plants at the different places indicated, together with the average monthly temperatures. The temperature at Ames for the entire period was not procurable, those given being based on the readings at Des Moines and Iowa City.

H. C. IRISH,
Mo. Bot. Garden, St. Louis, Mo.

PHENOLOGICAL NOTES AT THE MISSOURI BOTANICAL GARDEN.

Name of plant.	1892.	1893.	1894.	1895.	1896.	1897.
Silver maple (<i>Acer dasycarpum</i>)	March 10.	March 5.	March 8.	.....	.....	February 18.
Norway maple (<i>Acer platanoides</i>)	.....	April 5.	March 22.	.....	.....	March 22.
Red maple (<i>Acer rubrum</i>)	March 31.	March 31.	March 19.	.....	.....	March 31.
<i>Achillea</i> <i>impatiens</i>.	.....	.....	.....	.....	.....	.....
[Ohio Buckeye] (<i>Esculus glabra</i>)	April 29.	April 18.	April 18.	June 12.	July 15.	June 29.
Red-flowering horse chestnut (<i>Esculus rubicundula</i>)	May 12.	May 12.	May 1.	April 25.	.....	April 24.
Sweet-scented azalea (<i>Avicinnia odorata</i>)	June 12.	May 1.	May 1.	.....	.....	.....
Barberry (<i>Berberis vulgaris</i>)	.....	.....	.....	June 3.	June 5.	April 28.
Hornbeam (<i>Carpinus betulus</i>)	.....	May 13.	May 1.	May 3.	.....	June 18.
Catalpa bignonioides	June 15.	April 12.	April 5.	May 3.	April 13.	April 27.
Fringe tree (<i>Chionanthus Virginica</i>)	.....	June 11.	June 7.	May 30.	.....	April 10.
<i>Clematis</i> <i>paniculata</i>	.....	.....	May 7.	.....	April 30.	.....
<i>Coronilla</i> <i>grandiflora</i>	.....	.....	.....	June 18.	May 15.	May 17.
Flowering dogwood (<i>Cornus Florida</i>)	.....	April 28.	April 24.	May 27.	.....	June 5.
Scarlet hawthorn (<i>Crataegus coccinea</i>)	.....	.....	April 20.	May 1.	.....	June 5.
Larkspur (<i>Delphinium formosum</i>)	.....	.....	.....	April 10.	April 25.	.....
Sweet William (<i>Dianthus barbatus</i>)	.....	.....	.....	May 20.	May 28.	.....
Dutchman's breeches (<i>Dicentra eximia</i>)	.....	.....	April 27.	April 18.	August 11.	.....
Bush honeysuckle (<i>Diervilla Florida</i>)	.....	May 5.	May 9.	April 23.	May 10.	May 19.
Leatherwood (<i>Dryca palustris</i>)	.....	.....	.....	May 1.	May 15.	May 8.
Burning bush or maloo (<i>Enonymus atropurpureus</i>)	April 15.	.....	March 18.	March 29.	April 6.	April 1.
Golden bell (<i>Forsythia viridissima</i>)	.....	May 31.	May 29.	.....	May 18.	June 10.
White ash (<i>Fraxinus Americana</i>)	April 14.	March 22.	March 18.	April 1.	March 31.	March 28.
<i>Hibiscus</i> <i>synacus</i>	.....	.....	April 23.	.....	.....	.....
<i>Hydrangea</i> <i>paniculata</i>	.....	.....	.....	July 13.	June 10.	June 29.
<i>Iris</i> <i>laevigata</i>	.....	.....	.....	June 25.	June 15.	July 19.
<i>Iris</i> <i>pumila</i>	.....	.....	.....	April 11.	May 6.	June 15.
<i>Kerria</i> <i>Japonica</i>	.....	.....	.....	April 20.	April 8.	April 9.
Tulip tree (<i>Liriodendron tulipifera</i>)	.....	.....	.....	May 7.	April 15.	April 17.
Cardinal flower (<i>Loebelia cardinalis</i>)	.....	.....	.....	June 20.	June 28.	May 11.
<i>Magnolia</i> (<i>Lennel</i>)	April 17.	.....	March 22.	April 6.	.....	July 6.
Oswego Tea (<i>Monarda didyma</i>)	.....	.....	June 30.	.....	.....	July 6.
Box elder (<i>Negundo aceroides</i>)	.....	.....	.....	June 29.	July 5.	August 1.
Moss pink (<i>Phlox subulata</i>)	.....	April 3.	March 19.	.....	April 20.	April 20.
White poplar (<i>Populus alba</i>)	April 6.	March 28.	March 30.	April 10.	.....	.....
Cottonwood (<i>Populus monillera</i>)	March 31.	March 31.	March 21.	.....	.....	.....
Japanese-elm (<i>Pyrus japonica</i>)	.....	.....	.....	April 9.	April 10.	May 7.
Rose acacia (<i>Robinia hispida</i>)	May 16.	May 13.	May 6.	May 3.	May 17.	May 17.
Common locust (<i>Robinia pseudo-acacia</i>)	May 13.	May 17.	May 10.	May 16.	.....	.....
Snowberry (<i>Symphoricarpos racemosus</i>)	.....	.....	.....	April 10.	June 22.	July 19.
Lilac (<i>Syringa vulgaris</i>)	April 27.	April 14.	April 5.	June 21.	April 14.	April 23.
Virginia creeper (<i>Ampelopsis quinquefolia</i>)	.....	July 9.	July 5.	.....	.....	.....
<i>Xanthoxerus sorbifolia</i>	.....	.....	.....	June 23.	April 17.	April 27.
<i>Yucca filamentosa</i>	.....	.....	.....	June 9.	May 25.	.....
Prickly ash (<i>Zanthoxylum Americanum</i>)	.....	.....	.....	April 12.	.....	April 6.

Name of plant.	Phenological notes at Manhattan, Kansas.				Phenological notes at Ames, Iowa.			
	1894.	1895.	1896.	1897.	1896.	1891.	1892.	1896.
Silver maple (<i>Acer dasycarpum</i>)	March 3.	Feb. 28.	Feb. 22.	March 10.	March 10.	April 26.	May 1.	March 28.
Western buckeye (<i>Esculus arguta</i>)	April 17.	April 11.	April 18.	April 23.	April 23.	April 26.	June 1.	April 15.
Shadbush (<i>Amelanchier canadensis</i>)	May 10.	May 4.	May 5.	May 19.	May 19.	April 26.	June 5.	April 23.
False indigo (<i>Amorpha fruticosa</i>)	April 2.	May 13.	April 30.	April 7.	April 7.	April 26.	June 5.	April 12.
Wind flower (<i>Anemone pennsylvanica</i>)	May 24.	April 8.	May 27.	April 27.	April 27.	April 26.	June 30.	April 12.
Everlasting (<i>Anemone plantaginifolia</i>)	April 19.	April 17.	April 18.	April 27.	April 27.	April 26.	June 30.	April 12.
Butterfly weed (<i>Asclepias tuberosa</i>)	May 1.	April 4.	April 7.	April 18.	April 18.	April 26.	June 7.	April 20.
Papaw (<i>Asimina triloba</i>)	April 3.	April 9.	April 7.	April 18.	April 18.	April 26.	May 18.	April 20.
Asparagus officinale	April 24.	April 20.	March 20.	March 30.	March 30.	April 24.	May 30.	April 10.
Milk vetch (<i>Astragalus carycarpus</i>)	March 17.	March 24.	March 6.	April 4.	April 4.	April 24.	April 23.	April 4.
False indigo (<i>Baptisia europa</i>)	March 24.	March 31.	April 24.	May 2.	May 2.	April 24.	June 1.	April 10.
Shepherd's purse (<i>Capsella bursa-pastoris</i>)	April 20.	April 22.	April 14.	May 15.	May 15.	April 24.	June 5.	April 10.
Pennsylvania sedge (<i>Carex pennsylvanica</i>)	April 6.	April 2.	April 14.	May 15.	May 15.	April 24.	June 5.	April 10.
Small red-root (<i>Ceanothus oxatifolius</i>)	May 16.	May 17.	May 14.	May 15.	May 15.	April 24.	June 5.	April 10.
Hackberry (<i>Celtis occidentalis</i>)	April 19.	April 27.	April 25.	May 15.	May 15.	April 24.	June 5.	April 10.
Ox-eye daisy (<i>Chrysanthemum saccanthemum</i>)	May 12.	April 5.	April 13.	April 11.	April 11.	April 24.	June 5.	April 10.
Scarlet hawthorn (<i>Crataegus coccinea</i>)	May 20.	May 10.	May 5.	May 20.	May 20.	April 24.	June 5.	April 10.
Larkspur (<i>Delphinium azureum</i>)	May 9.	April 30.	May 5.	May 20.	May 20.	April 24.	June 5.	April 10.
Burchman's breeches (<i>Dicentra cucullaria</i>)	May 7.	May 8.	May 16.	May 15.	May 15.	April 24.	June 5.	April 10.
Burning bush or mahoe (<i>Enonymus atropurpureus</i>)	May 5.	April 3.	April 7.	April 3.	April 3.	April 24.	June 5.	April 10.
Honey locust (<i>Gleditsia triacanthos</i>)	May 5.	April 3.	April 7.	April 3.	April 3.	April 24.	June 5.	April 10.
Black walnut (<i>Juglans nigra</i>)	May 5.	April 3.	April 7.	April 3.	April 3.	April 24.	June 5.	April 10.
Moon seed (<i>Mentispermum canadense</i>)	April 25.	April 30.	May 18.	May 18.	May 18.	April 24.	June 5.	April 10.
Box elder (<i>Negundo aceroides</i>)	April 8.	April 2.	April 5.	April 10.	April 10.	April 24.	June 5.	April 10.
Phlox divaricata.	April 20.	April 20.	April 18.	April 24.	April 24.	April 24.	June 5.	April 10.
May apple (<i>Podophyllum elatum</i>)	April 19.	April 22.	April 20.	April 24.	April 24.	April 24.	June 5.	April 10.
Cottonwood (<i>Populus monilifera</i>)	April 30.	April 30.	April 30.	April 30.	April 30.	April 24.	June 5.	April 10.
Choke cherry (<i>Prunus virginiana</i>)	April 30.	April 30.	April 30.	April 30.	April 30.	April 24.	June 5.	April 10.
Sweet scented crab (<i>Pyrus coronaria</i>)	May 7.	April 27.	May 12.	May 9.	May 9.	April 24.	June 5.	April 10.
Burr oak (<i>Quercus macrocarpa</i>)	May 6.	April 30.	May 12.	May 9.	May 9.	April 24.	June 5.	April 10.
Buffalo currant (<i>Ribes amenum</i>)	May 6.	April 30.	May 12.	May 9.	May 9.	April 24.	June 5.	April 10.
Common boxwood (<i>Saxifraga oppositifolia</i>)	May 6.	April 30.	May 12.	May 9.	May 9.	April 24.	June 5.	April 10.
Skullcap (<i>Scutellaria parvula</i>)	April 30.	April 22.	April 28.	April 29.	April 29.	April 24.	June 5.	April 10.
Star-flowered lily of the valley (<i>Smilacena stellata</i>)	April 17.	April 20.	April 17.	April 15.	April 15.	April 24.	June 5.	April 10.
Bladder-nut (<i>Staphylea trifolia</i>)	April 7.	April 8.	April 11.	April 15.	April 15.	April 24.	June 5.	April 10.
Madwort (<i>Thalictrum officinale</i>)	May 7.	May 4.	May 1.	May 8.	May 8.	April 24.	June 5.	April 10.
Red clover (<i>Trifolium pratense</i>)	May 4.	May 2.	March 9.	March 21.	March 21.	April 24.	June 5.	April 10.
American elm (<i>Ulmus americana</i>)	March 8.	March 25.	March 18.	March 21.	March 21.	April 24.	June 5.	April 10.
Slippery elm (<i>Ulmus fulva</i>)	May 12.	May 6.	May 9.	April 3.	April 3.	April 24.	June 5.	April 10.
Verbena bracteata	April 6.	May 6.	May 9.	April 3.	April 3.	April 24.	June 5.	April 10.
Viola palmata var.	April 3.	April 2.	May 20.	April 20.	April 20.	April 24.	June 5.	April 10.
Prickly ash (<i>Zanthoxylon americana</i>).	April 3.	April 2.	May 20.	April 20.	April 20.	April 24.	June 5.	April 10.

Missouri Botanical Garden, St. Louis.

Name of plant.

	1892.	1893.	1894.	1895.	1896.	1897.
<i>Fesculus glabra</i>	April 29.....	April 18.....	April 18.....	April 25.....	.....	April 24.....
<i>Acer dasycarpum</i>	March 10.....	March 5.....	March 8.....	.....	.....	February 18.....
<i>Acer saccharinum</i>	March 10.....	.....	April 15.....	.....	.....	April 26.....
<i>Amenanchier canadensis</i>.....	.....	.....	.....	.....	May 6.....	.....
<i>Amorpha fruticosa</i>.....	.....	.....	.....	May 16.....	April 24.....	.....
<i>Antennaria plantaginifolia</i>	July 24.....	.....	.....	April 26.....	.....	June 18.....
<i>Asclepias tuberosa</i>	July 11.....	.....	.....	June 1.....	June 8.....	March 15.....
<i>Capsella Bursa-pastoris</i>.....	.....	.....	.....	.....	.....	.....
<i>Carex Pennsylvanica</i>.....	.....	.....	.....	.....	.....	.....
<i>Dicentra Cucullaria</i>	April 21.....	May 31.....	May 29.....	.....	May 18.....	April 10.....
<i>Euconymus atropurpureus</i>.....	.....	May 17.....	May 10.....	.....	.....	June 10.....
<i>Juglans nigra</i>	May 7.....	.....	May 1.....	.....	.....	.....
<i>Magnolia acuminata</i>	June 16.....	.....	.....	.....	.....	.....
<i>Menispermum canadense</i>.....	.....	.....	March 19.....	.....	.....	.....
<i>Negundo aceroides</i>.....	.....	.....	March 31.....	.....	.....	March 20.....
<i>Populus monilifera</i>	March 31.....	April 3.....	.....	.....	.....	.....
<i>Prunus Americana</i>.....	.....	March 31.....	.....	.....	.....	.....
<i>Prunus Virginiana</i>.....	.....	.....	.....	.....	.....	.....
<i>Rhus cotinus</i>.....	.....	.....	.....	May 5.....	April 25.....	.....
<i>Ribes aureum</i>.....	.....	April 15.....	April 15.....	.....	April 12.....	April 13.....
<i>Ribes rubrum</i>.....	.....	.....	.....	June 13.....	May 15.....	.....
<i>Sambucus canadensis</i>	June 7.....	.....	March 10.....	.....	.....	.....
<i>Ulmus Americana</i>	March 29.....	May 3.....	.....	April 23.....	.....	.....
<i>Viburnum opulus</i>.....	.....	.....	.....	.....	.....	.....
<i>Veus riparia</i>.....	.....	.....	.....	.....	.....	.....

AVERAGE MONTHLY TEMPERATURES FROM FEBRUARY 1 TO MAY 30.

Month.	Missouri Botanical Garden, St. Louis.					Manhattan, Kan.					Ames, Ia.					Madison, Wis.....	Lansing, Mich.....
	1892	1893	1894	1895	1896	1897	1894	1895	1896	1897	1896	1891	1892	1896	1897	1894	1897
February	40	31	32	25	37	37	25	25	37	31	22	19	24	26	16	22	22
March..	40	44	51	44	41	47	47	43	38	42	34	27	33	32	27	32	32
April.	54	57	58	60	65	56	59	60	61	54	52	50	46	56	43	50	50
May	63	64	66	67	73	64	64	68	69	65	62	58	52	64	57	57	57
Means.	49	49	52	49	54	51	49	49	51	48	42	38	39	39	36	40	40

Means	41	38	30	48	49	32	48	49	41	58	50	48	57.4	53	63.3	68.3	69.4	64.2	63.3	65.6	67.7	68.9	71.8	62.9
Monthly sums . . .	1168	862	929	704	1067	1031	1253	1365	1598	1369	1282	1447	1696	1707	1734	1790	1940	1983	1951	1981	2025	2062	2284	2071
Monthly means.	40	31	32	25	37	37	40	44	51	44	41	47	54	57	58	60	65	56	63	64	66	67	73	64

TEMPERATURE RECORDS AT MANHATTAN, KANSAS.

Date.	February.				March.				April.				May.			
	1894.		1895.		1896.		1897.		1894.		1895.		1896.		1897.	
	1894	1895	1896	1897	1894	1895	1896	1897	1894	1895	1896	1897	1894	1895	1896	1897
1.....	20	1	35	29	43	27	22	30	47	35	36	47	59	70	55	56
2.....	31	18	35	31	54	48	27	24	63	46	39	54	73	69	61	56
3.....	18	1	47	33	61	20	28	31	50	50	50	48	56	62	64	55
4.....	28	5	33	31	60	28	31	41	47	64	54	47	67	69	66	61
5.....	39	8	28	30	35	27	44	35	43	60	47	44	67	69	75	65
6.....	41	1	32	31	40	33	28	29	62	43	52	43	66	70	76	66
7.....	40	6	15	30	37	38	34	50	63	46	65	42	41	74	75	64
8.....	39	6	22	24	45	31	38	51	52	51	52	46	66	81	74	69
9.....	27	11	33	33	55	47	43	38	41	57	59	42	67	67	68	60
10.....	15	11	32	26	49	29	35	46	47	62	75	45	53	54	71	67
Sums.	301	55	302	298	473	328	339	375	515	514	529	458	611	709	685	613
Means.	30.1	5.5	30.2	29.8	47.9	32.8	33.	37.5	51.5	51.4	52.9	45.8	61.1	70.9	68.5	61.3
11.....	7	14	35	21	46	35	25	35	49	66	66	52	60	51	73	39
12.....	8	16	33	26	53	37	22	57	56	59	57	47	70	61	67	53
13.....	15	17	35	32	51	14	19	17	55	65	54	47	74	56	57	52
14.....	11	20	48	31	56	12	20	27	58	66	70	52	71	66	57	55
15.....	10	19	37	30	49	15	27	37	62	64	78	51	79	60	62	63
16.....	37	25	26	38	63	20	33	47	73	45	67	47	71	54	61	68
17.....	35	38	35	35	68	47	33	56	72	51	67	60	65	58	74	71
18.....	29	34	36	35	49	18	31	39	60	53	50	65	55	66	64	71
19.....	11	32	30	36	50	36	29	52	50	59	66	47	50	56	60	74
20.....	11	45	22	43	56	34	40	45	47	75	64	59	57	57	71	74
Sums.	172	260	332	337	541	309	284	402	582	604	639	528	670	585	616	640
Means.	17.2	26.	33.2	33.7	54.1	30.9	28.4	40.2	58.2	60.4	63.9	52.8	67.	58.5	61.6	64.
21.....	16	36	42	32	45	41	44	38	44	53	59	72	61	59	71	74
22.....	21	39	48	23	32	53	40	35	56	57	65	57	69	59	69	69
23.....	16	47	44	26	43	49	36	31	59	62	69	72	58	65	74	66
24.....	16	53	36	34	28	57	47	33	57	63	64	65	61	64	81	59
25.....	32	47	50	27	18	50	52	42	61	64	71	63	61	61	74	61
26.....	43	52	58	11	18	58	47	47	68	67	74	68	70	66	74	73
27.....	41	53	45	33	43	65	47	43	71	68	77	64	67	79	70	67
28.....	41	48	40	36	27	72	54	58	77	75	65	49	61	86	64	59
29.....	.....	.....	31	.....	36	72	56	51	67	71	57	50	70	77	72	65
30.....	.....	.....	.....	.....	51	71	61	54	61	71	64	50	64	70	76	55
31.....	.....	.....	.....	.....	55	57	48	62	.....	.....	.....	.....	58	75	60	61
Sums.	226	375	402	224	379	645	559	494	621	651	695	423	691	731	785	632

Means..	28.3	46.8	44.6	28.	34.4	58.6	47.1	41.9	62.1	65.1	66.5	62.3	62.8	66.4	71.3	59.2
Mo. sums	699	690	1036	859	1399	1282	1153	1271	1718	1769	1833	1009	1572	2925	2986	1905
Mo. means	25	25	37	31	47	43	38	42	56	60	61	53	61	68	69	65

PLATE II.
NOTES AT MANHATTAN, KAN.

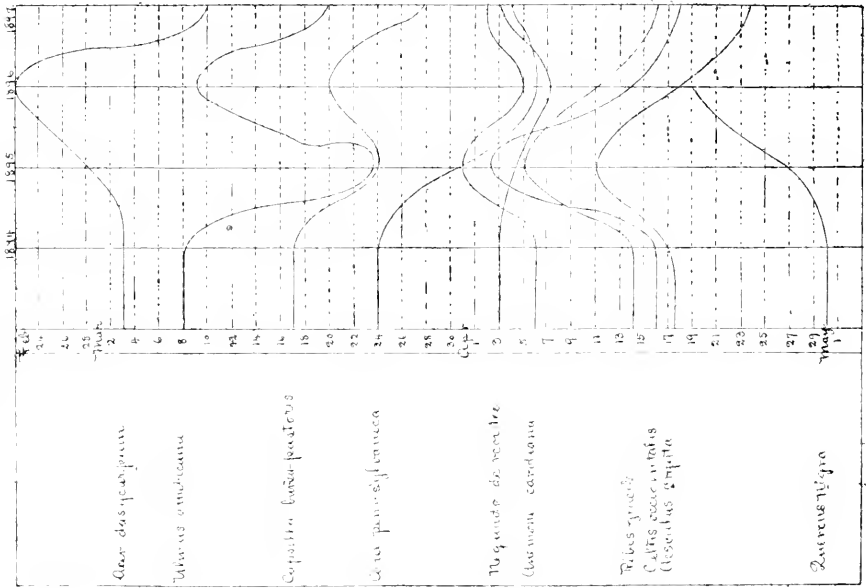
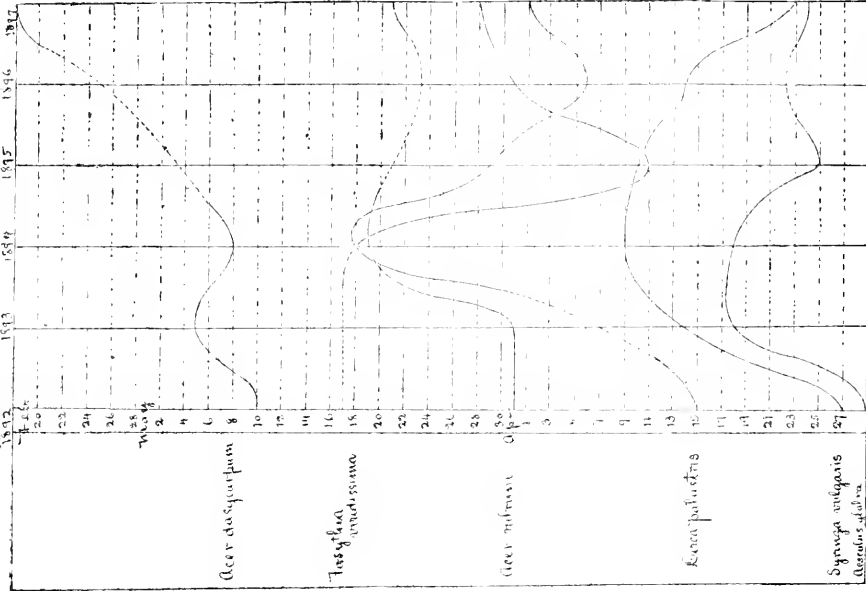


PLATE I.
NOTES AT MO. BOT. GARDEN.



WINTER MEETING.

PLATE III
NOTES AT AMES IOWA.

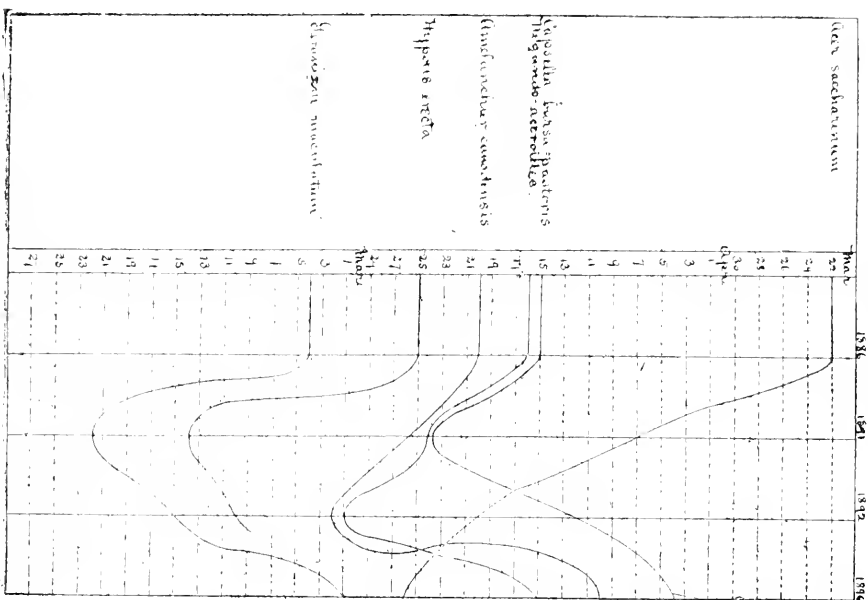
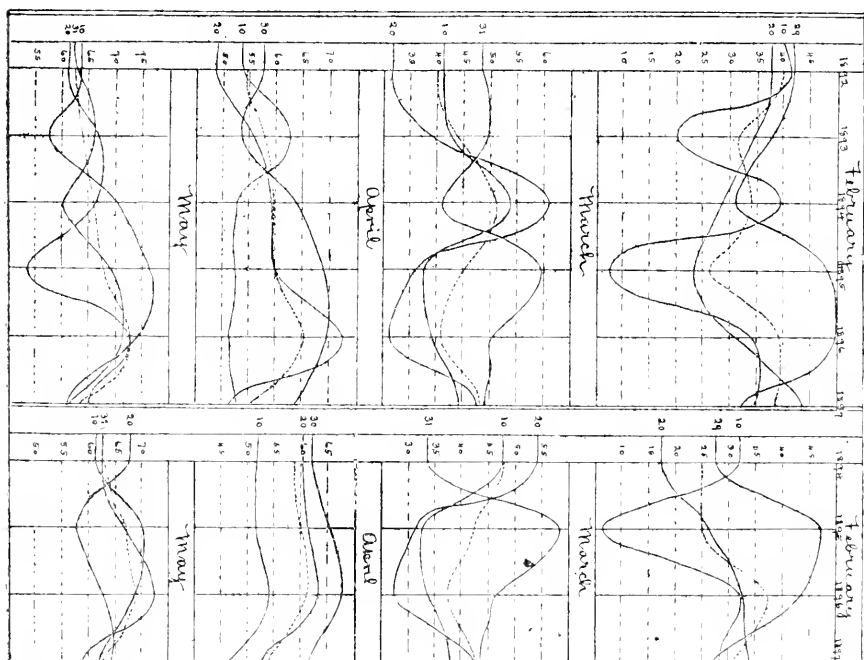


PLATE IV.
TEMPERATURE ST. LOUIS, MO.

MANHATTAN, KAN.





· MISCELLANEOUS PAPERS.



WHEN WILL APPLE PLANTING BE OVERDONE?

I am often asked this question. I say never! Why? Because the planting is not keeping step with the consumption. Again, the home of the apple is too circumscribed to supply the demands upon it. The area suited to the apple embraces the 40th parallel and two degrees on either side of it; that is the limit to successful apple growing. The demand for it is world-wide. Its consumption is as yet unknown in many countries. That it will force itself into recognition where now unknown is certain, especially when it becomes cheap enough to export. Last season three million barrels of apples were exported for European consumption alone. The demand promises to be much greater this year. There are today in this vicinity many buyers for apples for export trade. All agree that the crop is too small to meet the demand. The apple is unlike most other fruit in that its keeping qualities are such, through the improved methods of caring for them, that they can be kept through a long season, giving plenty of time to ship long distances. Their fine flavor and health-giving properties make them almost a necessity.

No, I do not look upon apple planting as I do many other fruits; but there is much to learn about apple planting if you would succeed. Today there are thousands of bushels of apples in our orchards that are useless and rotting for reason of no market. This is to the inexperienced a sure sign that the business is overdone. Is it? Let us see. In times past those of us coming from the east had our notions gained in the east, and planted such sorts as we were familiar with. These varieties, being of Northern origin, became fall varieties. In planting for commercial purposes only the best of late sorts should be grown. You should lay aside your preferences in this matter if you would succeed.

Plant the big red varieties known to do well in your vicinity. For Missouri and Kansas, Ben Davis, Gano, York Imperial, Jonathan, Missouri Pippin. These five varieties will give more profit than a larger list. Grown in groups, so as to avoid mixing varieties, is the proper way. It is very annoying to have varieties scattered through your orchard. The young farmer who may plant an orchard of ten acres of the varieties named will have, no doubt, more profit from the ten acres at the end of fifteen years than he will from the other ninety of his hundred-acre farm not so planted, but grown to other crops. The

varieties named are of the best winter sorts, Jonathan excepted. Jonathan can, by early picking, be made to carry over into spring. Its color, size, flavor and bearing qualities make it a necessity. The other varieties named possess more points of excellence than any other four with which I am familiar. Good trees, bear young, bear often, large, red, good keepers, good for cooking, handsome, bruises don't show, are widely known and wanted for export. These are some of the good points of these varieties. Can you name any other list with so many good points? I think not.

How soon will apples begin to bear? An orchard well cared for, of varieties named, will bring returns in three to five years; not much, it is true, until seven or eight years old, when the returns will far exceed any part of the farm not planted to fruit. I have picked two barrels of choice fruit per tree at eight years from planting. An orchard, if well cared for, at twelve years should return from three to five barrels per tree. This year, and it would apply to two years since 1890, or three years in seven, when apples in the orchard were worth \$2.25 per barrel, making from \$6.75 to \$11.25 per tree. Seventy trees per acre would return \$453.50 in the first case and \$787.50 in the second.

Now multiply these amounts by three, the number of crops since 1890, and the chances are that the orchard alone would have paid for the whole farm. This does not tell the whole story, for the other four years have returned something. No one year has been an entire failure. One other of the seven produced a good crop, but owing to the over-production elsewhere the margin of profit was reduced to a minimum, yet leaving a balance of profit. Can anything so good be said of any other crop? Surely not of wheat, rye, corn, oats, barley, potatoes or any agricultural crop. While it requires several years' patient waiting, when once established, the orchard is good for a generation, while other crops must be planted annually. Orchards are less susceptible to the vicissitudes of the weather than are grain crops. In the purchase of trees always consult your home nursery. If you would avoid mistakes, to say nothing of imposition, the tree circulator is a very uncertain quantity. Buy only of nurserymen of known reliability. Then if deception has been practiced you have redress. Don't be afraid to plant apples, for overproduction is not yet and will not be while you are in the business.—Col. Frank Holsinger, Western Fruit Grower.

GARDEN AND ORCHARD.

Some say to plant trees in the spring,
 And some say in the fall;
 But the worst are those who compromise
 And plant no trees at all.

If you can't make up your mind whether the spring or autumn is
 the better time for tree-planting, try both.

AMONG THE APPLES.

Red, and russet, and yellow,
 Lying here in a heap—
 Pippins, rounded and mellow;
 Greenings for winter keep;
 Seek-no-furtherers, whose blushing
 The soul of a saint would try,
 Till his face showed the crimson flushing,
 The cheek of a Northern Spy.

Hid from the winter weather,
 Safe from the wind and sleet,
 Here in a pile together
 Russet and Pippin meet.
 And in this dim and dusty
 Old cellar they fondly hold
 A breath like the grapes made musty
 By the summer's radiant gold.

Each seems to hold a vagrant
 Sunbeam, lost from the sky,
 When the lily blooms were fragrant
 Walls for the butterfly;
 And when the snow is flying,
 What feast in the boards I store
 Of crimson and yellow lying
 Heaped high on the sandy floor.

Fruitage of bright spring splendor,
 Of leaf and blossom time,
 That no tropic land can mend, or
 Take from this frosty clime—
 Fruit for the hearthstone meeting
 Whose flavor none can destroy,
 How you make my heart's swift beating
 Throb with the pulse of a boy.

Apples, scarlet and golden,
 Apples, juicy and tart,
 Bringing again the olden
 Joy to the weary heart.
 You send the swift thoughts sweeping
 Through wreckage of time and tears
 To that hidden chamber, keeping
 The gladness of youth's bright years.

—From Dumb Animals.

VARIATION IN APPLES.

When botanists study plants as species they are often surprised to find in the same genus of plants some species that have a remarkable tendency to vary. They will hardly find the same species growing with what they call the normal character in any two localities. On the other hand, says Meehan's Monthly, they will find some species in which the individuals seem exactly alike no matter in what part of the world they are found. This tendency to individuality is found among varieties of fruits just as much as among varieties of flowers, although it is not generally supposed. The Seckel pear is an illustration of this. Its peculiar flavor, a something which one can hardly describe, is always sufficient to decide that the one in question is a Seckel pear; but the difference is in size and form, and the character of the russeting will vary so that we have known pomologists of experience sometimes doubt whether the Seckel they had in hand was really a Seckel or not. The Baldwin apple is another class of varying individuals. Some years ago, Mr. Engle, an authority on apple nomenclature residing at Marietta, Pa., had one form of Baldwin so very far away from the normal character that he propagated it as a distinct kind, under the name of the Penn apple. The variations will frequently be found in the normal apple, the fruit being undoubtedly from the same tree or trees in the same orchard. The normal character of the Baldwin is to have the flesh of a greenish yellow tint, yet from the same tree will often be found one with the flesh of a clear white, and again some individuals of this white class will have a red tinge of the skin streaked through the flesh. We have seen this difference in the color of the flesh so very prominent that good judges of apples will frequently doubt whether the fruit which can undoubtedly be proven to be Baldwin was really such. The chief interest in this question comes from the thought which often arises as to whether fruits can hybridize to such an extent as to influence the fruit that is actually hybridized. In the case of the Baldwins referred to, the impression that would arise in the mind of the orchardist would be that the flowers had been fertilized by pollen from some variety with normal white flesh. The law of individual variation to which we have referred is quite sufficient to account for this or even greater changes.—*Prairie Farmer*.

THE HOME ORCHARD.

The home orchard and fruit-garden should contain a sufficient number of plants, vines and trees to grow an abundance of fruit for family use. Beginning with strawberries it should also contain raspberries, currants, gooseberries, grapes, cherries, quince, pears, plum and apples, and a number of varieties of each, ripening in regular succession, so as to keep up a constant supply of good fruit the whole year. It would be a matter of causing health and pleasure if carried into practice.

Yet, in place of this we find a great many farmers in Missouri who do not grow half enough apples and peaches to do their families, to say nothing of the other fruits. One fatal mistake made by many is the common practice of replanting the old orchard in place of planting a new one every 10 or 15 years. Not over one in ten of all the replants set in old orchards will ever reach a profitable bearing age. The mules, calves and stock get the most of them.

The land for berries and small fruits should be very rich and prepared in autumn by deep plowing, pulverize it thoroughly and plant in spring. Cultivate and keep thoroughly clean of weeds and grass. Garden truck may be grown to advantage in the home orchard and fruit garden.

Keep plenty of poultry and let the chickens have free access to your fruit garden and orchard, they will give you double service, to wit: in their product and in cleaning up insects and protecting your fruit. Bees are also a great help to the fruit-grower, and aid in the fertilization of the fruit buds, and in addition thereto furnish a supply of fresh honey.

We hear much about spraying, and I am a friend to spraying, in fact the commercial fruit-grower must spray, but the farmer has not time nor will to do it. We have been spraying for the last 15 years, yet not one farmer in a hundred in Missouri is spraying. So permit me again to urge upon you the importance of clean cultivation and the keeping of poultry.

If the family orchard and fruit garden is on deep rich soil and cultivated often and in a manner to keep a fine pulverized surface, and two to three hundred chickens are allowed to run in the same, you will have but little damage from insects, and this system of culture will

hold the moisture, which to the people of Missouri is one of the most important factors in growing fruit.

Save all your wood ashes and scatter broadcast over the ground and cultivate them in if the land is close and heavy, and if you can't get the ashes use lime; it will cut the clay and tough close soil and liberate the plant food.

Turkeys are also good to eat the insects. The poultry may be shut out of the fruit garden and orchard by the use of two-inch mesh wire fence three feet high, which is cheap and easily constructed.

Gather up all wormy, scabby fruit, boil in water to kill the larvæ of insects, then feed to hogs.

If you have not followed the plan outlined in this article, please try it and if it does not prove a success please report to your humble servant.

N. F. MURRAY, Oregon, Holt county, Mo.

IMPORTANT WINTER ORCHARD WORK.

Black knot may be held in check by proper treatment in the winter. The work should not be left until growth starts, as the disease may then spread to many trees. Cut off diseased branches some distance below the point of visible attack, as the mycelium, or vegetative part of the fungus, spreads through the tissues beyond the point of apparent attack. The winter spores are mature now, or approaching maturity, and these, under favorable conditions, germinate and spread the disease. In pruning infected trees use care that the blade of the knife does not come in contact with the spores. There is no doubt that this disease is frequently carried to other trees by pruning. I have occasionally observed that in grafting the plum black knot makes its appearance where the scion is put onto the graft.

Bladder plum or plum pocket occurs on different species of the plum, and is caused by different species of *excascus*. It is of annual reoccurrence in different species of the plum. The swollen bladder, which is found on the Chickashaw and that type of plum, commonly recurs on the same tree. In some cases the diseased portions were very much greater than the sound.

Cedar apple fungus and apple rust, as is well known, is connected with the rust occurring on the crab apple. By removing the kidney-shaped brown galls on the red cedar in the winter, the cluster cup fungus of the apple may be prevented. Of course, where the cedar gall is very numerous, this may be quite troublesome. It is better not to have the red cedar in proximity to a bearing orchard.

Pear blight may be lessened by the exercise of a little precaution on the part of horticulturists. If all the dead and blighted branches are cut off in the winter and the trees washed with a solution of copper sulphate, the amount is greatly reduced.

Plum rot is severe in the Mississippi valley. It attacks many varieties of the cultivated red plum when ripe or nearly ripe, and frequently when half grown. Some seasons it is very severe during the flowering period, especially during moist and rainy weather. The fungus attacks the petals, stamens and pistil. Soon the whole branch becomes affected. In a few days not a single healthy flower will remain, and hence crop failure. Careful observation will show that it starts from certain parts of the tree where the old attacked plums are hanging on the tree. The object lesson is plain. Remove all the diseased plums in the fall. Rubbish heaps containing the spores of fungi are too often neglected. They should be burned.

I have noticed for a number of years that spot disease of the cherry is very much more frequent in nurseries and old orchards and places where the disease has been known for years. This certainly is an indication that it can be prevented by removing the diseased leaves. This disease is so bad that the common varieties of the cherry cannot be grown from pits. Thus a lot of seedlings of Shadow Amarelle lost nearly all of their leaves in July. The disease should not only be treated with fungicides but the old leaves should be removed and burned.—L. H. Pammel, Iowa, in *Orange Judd Farmer*.

APPLES FOR COLD STORAGE.

Mr. W. J. Murray, connected with the cold storage department of the Armour Packing Co., in an interview given to the *Kansas City Packer*, makes the following suggestions about apples that are to go into cold storage. "Pick apples a trifle green—according to length of time they may be in storage, but not so green as to affect proper color when fully ripened. Throw out all apples that are small, misshapen, slightly bruised, wormy or very much off in color; dispose of them as No. 2. It was never intended that any but perfect apples should go into cold storage, which cannot stop decay already begun, nor make imperfect apples perfect. Even perfect fruit that is full ripe cannot keep very long in cold storage. Remember that apples will be examined carefully before they are purchased, and a few poor ones in a barrel of fancy stock may compel salesmen to sell the entire barrel on the value of the few imperfect apples. Every apple should be handled

as carefully as a costly piece of bric-a-brac. All punctures or bruises of even the skin impair the keeping qualities. The least bruise caused by rolling, dropping or throwing apples into barrels may start decay in one apple which will affect a dozen others around it. Face the barrels well, but back up the face by packing, goodsized, sound fruit right through. There is a growing demand for fancy apples packed in boxes, there being a large retail trade that will buy a box of apples where they won't take a barrel, and pay a little more in proportion. But this trade wants nothing but the best. Of course there will always be a demand for apples in barrels—and it is poor policy to use any but the best of barrels. Use liners, both at top and bottom, and use the smallest nails possible. Stencil faced end of barrel with name of variety of fruit and name of owner. Get the apples into the storage-room as soon as possible after they are picked. Barrels should not be rolled, but either carried or run in on tracks and boxes must not be thrown in a pile like cordwood, but laid down as gently as possible."

To growers he adds: "Pack fruit for this season only; get a reputation for good, honest pack, and in time your stock will command a premium on the market. Not only should the fruit-grower make improvements every year in the growing and handling of his fruit, but the wide-awake cold storage concern will also make improvements towards the better keeping and marketing of fruit." The Packer says that among other changes to be made at this cold storage house this year, such soft varieties of apples as Huntsman, York Imperial, Jonathan, etc., will be kept in a temperature of 40 instead of 33, as has been the custom; the reason of this being that in past experience the extreme cold temperature is the cause of "scalding." The house has, therefore, opened a room especially for these soft fruits, and all who agree with them in this can have their soft fruits held at this temperature. They will also have a large ante-room, into which the fruit will be first received, the temperature of which will be about 50 degrees, believing that sudden change from extreme heat to extreme cold is hurtful, and that the stock will hold up much better if gradually cooled. They will leave stock in this room at least twenty-four hours before putting it into the colder rooms. This, also, is at the option of owner of the fruit. This room will also be of benefit to the fruit when taking it out in the warm spring days; for instead of going out from a temperature of 33 to one of 85 or 90 degrees, it will be brought out gradually, thus preventing so much sweating, which takes the life out of apples. It is already a complaint among fruit-dealers that cold storage apples do not hold up well after coming out of storage. The cause is believed to be in the sudden great change, but by making this change gradual

it will do away with this objection. The management has adopted a new system of stacking apples, so that, if the owner is a little careful, there will never be any necessity of handling a single barrel until the owner is ready to take it out of storage, the idea being to handle the fruit as seldom as possible.—Farmers' Review.

HOW TO KEEP APPLES.

The proper temperature for keeping apples is as nearly 35 degrees Fahrenheit as it is possible to keep it, and in order to maintain this it will often be necessary in this climate to provide a separate place for storing the fruit, as the average cellar under the dwelling-house is wholly unfit for this purpose. If the cellar consists of several compartments so that one can be shut off completely from the other, and the temperature in this kept below 40 degrees, it will answer the purpose very well. If this cannot be done, a cheap storage-house may be built in connection with the ice-house by building a room underneath, having it surrounded with ice on the sides and overhead, with facilities for draining underneath, keeping the air dry by means of chloride of calcium placed on the floor in an open, water-tight vessel, such as a large milk crock or pan. In this way the temperature may be kept very near the freezing point the year round, and apples may be kept almost indefinitely.—Indiana Experiment Station.

PRUNING APPLE TREES.

I have studied the question of pruning apple trees and practiced on my own studies and observation, and after many years and much time spent and in losing an orchard of two acres by injurious trimming, I hit on what I consider the right time for our state and climate, and no doubt the same practice will work well in other states. By trimming in all months from March 1 to July 1, and by close watch, I am sure the best and safest time to trim apple trees is about the time the buds are opening or soon after. No trimming should be done after the 15th of June in any climate. While the buds are opening there is a full flow of sap, so at that time the wounds will heal over much sooner than at any other time in the year. When trees are trimmed in winter the wound will dry and crack, and oftentimes the bark will cleave off the wood, and in that case it will never heal over, and in all probability will cause premature decay. The pith of the limbs leads

to the heart of the trees. The heart of a tree affected will always cause deterioration or death.

Trimming is of much more importance than most people suppose. The anxiety of farmers to raise live-stock and grain causes them to forget the orchard to its utter neglect. They castrate the calves, lambs and pigs, but never think of taking a limb off a fruit tree. The orchard needs feeding and nursing just as much as the live-stock on the farm. Every fall, as soon as the ground is slightly frozen, a good mulch should be spread on as far around as the roots extend. The mulch will keep the roots from freezing and thawing, and hold the frost in the ground in spring so that the buds will not open so early as to be injured by late freezing.

In trimming, I never cut off a limb over an inch through, if I can avoid it and do justice to the tree. Sometimes two limbs may cross each other, and then it may be necessary to take off one of them. Then oftentimes that can be avoided by placing a spreader in between them or tying off to another limb. Such unnatural growth can be avoided if the orchard is cared for in its younger days.

The nurserymen never trim trees to ship to their customers; so the recipient must exercise his best judgment in trimming. I have often been told, while performing that duty, "Oh, man, you are ruining that tree!" But I never suffered loss by so doing. Some years ago, in passing a neighborhood that had an apple orchard of some eight or ten years' growth, I saw the proprietor trimming it. I called to him, "George, you are ruining your orchard!" He came to me and said, "What do you know about trimming apple trees?" I told him I knew enough about it to know that not one tree in ten of those he had trimmed would be alive over three years—and so it proved. He had trimmed about one-half of the orchard then; by my advice he left off. The half left grew and flourished, but, as predicted, the trimmed part died. Every wound should be covered with tar or paint. Scraping off the rough bark and whitewashing should be practiced once in two years at least. Nothing on the farm pays better than a well-cared-for apple orchard.—E. Reynolds, Fond du Lac county, Wis., in Country Gentleman.

TOP GRAFTING IN COMMERCIAL ORCHARDS.

Appearance has much to do with the selling value of trees. Quality, evenness of growth and ripeness of wood are most important. Town lot property that will admit of but very few trees and where it is possible to plant two or three each of the apple, plum and cherry, can

be made to produce a succession of fruits. The entire fall list of apples, as Wealthy, Haas, Lowell, Snow, can be produced on one tree. The summer list, as Duchess, Red June, Sweet June, Benoni, on another, and Ben Davis, Jonathan, Grimes Golden, Janet, on another.

A pleasing lot of combinations can be made with different varieties in the different seasons. Also with respect to color, degree of acidity, mildness of flavor. To illustrate. It is entirely possible to give a patron a tree bearing three or more kinds of sweet apples, ranging through different seasons, or a tree bearing four different colored apples, as Jonathan, Grimes, Huntsman, Annett, or Jersey Black, being red, yellow, bronze, and black, respectively. In plums, quite a considerable advantage can be given a planter in length of season. I believe that mixed tops will give the most satisfaction and best results.

The stock most suitable for the apple is the Virginia crab, but on light prairie soils, Haas is good and to it could be added Duchess, upon which to work slow-growing varieties such as Red June, Early Joe, Wealthy, and more moderate growers, as Benoni and Dyer. From the behavior of the Hybernal we would regard it as a good stock for north and would add Walbridge and Iowa Blush, for central Iowa or the southern circuit where such work would be profitable or necessary. The Virginia crab has few objections as a tree to top work. It makes a heavy six-foot tree $\frac{3}{4}$ inch caliper and upward at three years. Practice budding in the tops six to ten inches from the forks in August, on three-year-old trees, using either dormant buds held over in ice or cold storage, or green buds if well enough developed. Cut back to these buds the following spring, or the work can be deferred until the following early June or late May, when the buds can be set and developed into branches at once.—W. M. Bomberger, Iowa, in Orange Judd.

PLANT RUSSIANS CAUTIOUSLY.

After ten years of extensive trial it must be said that for the south half of Iowa at least the experiment with Russian fruit has been not only a disappointment, but a serious and costly failure. To recommend the extensive planting of these fruits in this district would now seem little less than criminal.

It is well to be enterprising and keep as near the front of the procession in one's own calling as possible, but in a few ways is it easier to lose money than to be too ready to plant largely of new and untried varieties because some one recommends them. If a new fruit or plant is offered, having originated near by and under substantially the same conditions, it may safely be planted with far less experience than if it

comes from a different botanical region, especially if from another continent. A seedling must find favor at its place of origin, if at all, for the reason that it is especially adapted to the conditions of soil and climate prevailing there. It succeeds there because its constitution is fitted to those conditions, and it follows of necessity that the chances are strongly against it being equally well adapted to succeed under the quite different conditions of a different state or country.

All this was specially emphasized the past season (1896) of uninterrupted sun, which was so favorable to the rapid increase of insect life, so that we may properly consider this as one of the beneficial lessons taught by our lean year. The season was not without its uses also in winnowing out from our lists undeserving varieties. I will not attempt to account for the facts observed, but it was true on my grounds, as I pointed out to many visitors, that foreign varieties of fruit of late introduction suffered far worse from insect ravages than the average of our old sorts cultivated and acclimated here for a quarter century or more.

The Russian apples, both in nursery and in orchards, were examples strikingly in point. There was an unusual activity of the leaf roller and leaf skeletonizer, and but for the spraying apparatus, the injury would have been irreparable.

In one nursery of two-year trees, one might readily distinguish two hundred yards away the rows of Russians of the Hiberna family, intermingled with the rows of various older sorts, the broad leaves of the Russians turning red and dry under the same care which produced a fair degree of health and vigor in the leaves of the others. I can only account for this lack of resistance on the part of the foreigners by the fact that our conditions must have been in some manner less favorable to their vigor than the conditions of their native places.

One of our most famous physiologists affirms that it takes at least four generations of men to adapt a people to the conditions of a continental change of climate, and that the adaptation is secured only at the expense of much mortality and a profound change of physical and nervous organization. Now, it is a plain fact that a tree must be far less able to withstand the vicissitudes of a change than a man who may vary at will his food and dress and shelter, as seems to suit his physical needs, while the tree or plant is rooted to one place and subject to the full force of every unfavorable influence. I have thought it advisable to grub out the last of my Russian plums and cherries, and I believe that the last of the pears and apples, save one or two, must share the same fate.—C. L. Watrous, Iowa, in Orange Judd Farmer.

THE GANO APPLE.

As the Gano apple is increasing in popularity in the Ozark country we are sure that readers of the Southwest will be interested in the following particulars, which we obtained at Moberly during the meeting of the State Horticultural Society, in an interview with the honored citizen who originated this apple, Mr. W. C. Gano of Parksville. He has a 40-acre orchard, and is making a strong effort to retrieve his losses of a few years ago. His trees are mostly of the Gano variety. The tree, he says, in its growth is identical with the Ben Davis. Some claim that the Gano apple is a cross between the Ben Davis and the Jonathan, but this is a mistake. Mr. Gano says the apple was originated in an orchard that never had a Jonathan tree in it. This orchard was planted in 1844. Mr. Gano came into possession of the place in 1869. Some of the trees were Ben Davis and others were seedlings. The Gano tree became famous for its beautiful fruit, and cuttings were freely made from it, but Mr. Gano never made a cent from the sale of scions from this tree. Nurserymen propagated the apple, and thousands of trees will be set this season in this and other states. The apple is not so large as the Ben Davis, but is large enough, is deeper colored, a little more juicy and as good a keeper.

Mr. Gano, as is generally known, was one of the Olden Fruit Company, and gave four of the best years of his life as superintendent of that farm. He retired from the company when L. A. Goodman went out. The best wishes of everyone who reads these lines will go out to W. G. Gano.

THE BEN DAVIS APPLE.

Of late years much that is detrimental has been said of this apple. No doubt it has its faults the same as other varieties of keeping apples. The oft-repeated assertion that they were pithy and tasteless is true to some extent at picking time. But keep the apple until January or later and note the wonderful improvement that has come over it.

The character of the soil, location, etc., where apples are grown, has much to do with the size, taste and color. Apples that are grown on low land are never as good as those grown on upland. Ben Davis, or any other apple, grown along the creek bottoms will not compare for size and color with those of the same type grown on higher ground.

Twelve years ago a neighboring fruit-grower, Eli Wheaton, set out 50 apple trees—40 Rome Beauty and 10 Ben Davis. They were set out side by side and have received exactly the same treatment since. The orchard is on high land, facing to the south. The soil is of a sandy nature, with a little light clay mixed.

In the fall of 1895 nine barrels of salable apples were picked from the 10 Ben Davis. Last year they were also full of fruit. This season, when the winter visited the orchard, on September 22, they were moderately full of nice, sound apples that were coloring up finely. The 40 Rome Beauty that stand by their side have not so far produced a single crop. The trees look thrifty, and, although they were full of bloom last spring, there is not a tree that has on it to exceed a peck of small and inferior apples.

The trees have been thoroughly and properly trimmed, and the fruit on one should be the same as the other. It has been intimated by some that the Ben Davis was a slow seller. Yes, they are, if you grow an inferior type. So is any other inferior apple.

The talk that the Ben Davis is looked down on by the buying public is only the talk of those that have been unsuccessful in growing them. Show me a nice, smooth red apple and I will guarantee you it will sell regardless of its name. The apples produced by the grower in question, of the Ben Davis variety, have found sale side by side with Rome Beauty and others at the same figure.

The day of the Ben Davis apple is no more past than is the day of the Rome Beauty or other winter varieties that are grown for commercial purposes throughout this section. Indeed, on more than one fruit-grower's farm has the Ben Davis proven the bearer, while the Rome Beauty and others failed to mature a crop. They have often of late years blossomed profusely, set many apples, but they have principally dropped off before picking time. It looks in some instances as if the Rome Beauty, a native of the State, has had its day, instead of the much abused Ben Davis, which is surely an apple that is holding its own in this section.

That the Ben Davis is a good keeper is admitted by all. While at picking time they may be inferior in taste to some other winter varieties, how about the same apple in the late winter and early spring months? It is then the apple is at its best. Then, too, most other apples are gone and the best prices prevail. The apple that at picking time was not the best eating one is now at its proper season. If they have been grown on upland they are not tasteless and will sell in any market.

The main drawback in setting out the Ben Davis, as well as any

other apple, is to know whether or not they are adapted to your soil and climate. Visit the orchards in the vicinity and note the character of the soil that the different varieties do best on. This can easily be found out from the owner of the orchard, who will be glad to impart any information that he has. This is the surest and best way to ascertain, beyond a doubt beforehand, the apple that will do best for you. If you find that the Ben Davis does well in the vicinity on the same soil as yours, do not hesitate, but set out an orchard of them. If on the other hand, you find that repeated failures have been had with the Ben Davis, while at their side some other variety has done well, it will be policy to set out that kind.—Cincinnati Commercial Gazette.

WHY BARRELLED APPLES KEEP.

If apples were placed loosely in barrels they would soon rot, though passing over only a very short distance of travel, and yet, when properly barreled, they can be sent thousands of miles, even over the roughest ocean voyage, in perfect security. This owing to a fact discovered years ago, without anyone knowing particularly the reason, that an apple rotted from a bruise only when the skin was broken. An apple can be pressed so as to have indentations over its whole surface without any danger of rotting, providing the skin is not broken. In barreling apples, therefore, a gentle pressure is exercised, so that the fruit is fairly pressed into each other, and it is impossible for any one fruit to change its place in the barrel on its journey. In these modern times we understand the reason. In the modern times the air is full of microscopic germs which produce fermentation, and unless they can get an entrance into the fruit, rot cannot take place. A mere indentation without a rupture of the outer skin does not permit the action of these microbes.—Meehan's Monthly.

SUGGESTIONS TO APPLE PACKERS.

Apples from the Austrian Tyrol which retail in German markets at high prices are beautiful in appearance and firm of tissue, though inferior to the best American apples in flavor and juiciness. These apples are carefully picked by hand when dry, or if damp when gathered, are thoroughly dried, and then placed by hand closely in barrels lined with heavy manilla paper. At the bottom and top of the cask is placed a thick layer of "wood wool," or excelsior, or dry soft straw,

and the barrel head being pressed down over this and fastened, the fruit is held firmly by the pressure of these two elastic cushions. Finally holes are bored through the side and both heads, which will admit air, and in this manner fruit is brought from the Alpine slope so free from injury it will keep throughout the winter without being unpacked or opened.—Exchange.

COST OF DEVELOPING A PEACH ORCHARD.

ESTIMATE FROM CONNECTICUT.

It is very difficult to make estimates that will cover the situation extendedly, so much depending upon the character of the soil to be worked and local prices of labor in the various sections of the country. To plow and prepare an acre of land for peach-planting costs all the way from \$5 to \$25. The planting will cost from \$4 to \$10, and the annual cultivation from \$10 to \$30 per acre. Then, of course, comes the cost of trimming of trees, thinning of fruit and fighting of insect and fungous pests, which will vary every year from \$5 to \$25 per acre, according to conditions. Then marketing the fruit, careful picking, proper grading, packing and selling, will cost from 20 to 35 cents per half-bushel basket. If one were to take a share of the crop for marketing, one-third would probably be a fair average compensation.

In some sections of the country I should want more than that, and in other sections it could be done for less. I know figures are given out by land agents and others, who are trying to develop the peach business so as to sell lands, that are very much below these presented herewith, but to build up and maintain a profitable peach orchard, the amounts of money I have named will have to be expended. This estimate is based on the experience of planting and establishing more than 1,500 acres on a great variety of soil.—J. H. Hale.

MICHIGAN ESTIMATE.

There are so many conditions that would modify the cost, such as character of soil, price of labor and frequency of a crop, that only an approximate estimate can be given. The cost of plowing, harrowing, marking, planting and pruning the trees would vary from \$6 to \$12 per acre, with \$10 as a safe average, where a large area is to be planted. Cultivating, hoeing and pruning to form the head would cost \$4 or \$5. One dollar could be spent in the fall for seed and sowing of some cover crop. The next year the pruning will cost perhaps 50 cents per

acre, and this will increase each year until the trees are full grown, when, if they are headed back, the expense will be \$5 to \$10.

There will also be each year \$5 to \$10 for plowing, harrowing, cultivating and hoeing. When the trees come into bearing the thinning will run from \$2 up to \$8 or \$10, and there should also be an account made of hunting for borers, jarring for cures, or spraying for this and other insects and the various fungous diseases. In some sections that I know of the entire cost of picking, packing and marketing does not exceed 10 cents per bushel, while in others it is several times that amount.

The crop and the returns are so uncertain that one would hardly be justified in taking an orchard on shares. Thus last year with a full crop and glutted markets many growers allowed the fruit to remain on the trees, as the returns did not pay for the cost of marketing. This year the crop is a failure in all except a dozen counties along Lake Michigan, and there with a quarter or a half crop the orchards are proving quite remunerative owing to the prices secured.—Prof. L. R. Taft.

AN OHIO OPINION.

To set trees, plow, harrow and mark off will cost probably \$6 to \$8 per acre. To keep the land cultivated about \$8. To gather about 10 cents per bushel, including hauling to packing house, and about five cents per bushel to grade and pack. Of course, the above is only an estimate. I have 600,000 peach trees in orchard in Georgia and Kentucky.—N. H. Albaugh.

FROM NEW JERSEY.

It is our experience that it will cost about \$7.50 per acre to plow, harrow, mark off and set peach trees 18 by 18 feet. The annual cultivation will cost from \$4 to \$5. The cost of marketing the crop will naturally depend upon the size of the crop, character of the fruit and the distance from market, and it is, therefore, difficult to make a fair estimate.—Prof. B. D. Halsted.

NATIONAL EXPERIMENTS IN PEACH CULTURE.

The following extract from the minutes of the last meeting of the Association of Colleges and Stations gives the outline of the work to be undertaken:

"A paper prepared for the section by R. H. Price, of Texas, was concluded by the following memorial: In view of the importance of

this classification to successful peach culture in the United States, I wish to make the following recommendations:

"1. That a committee of three be appointed to be known as a committee on co-operative work in testing the different races of peaches.

"2. This committee shall consist of one horticulturist from one Northern station, one from one Southern station, and one from one Central station.

"3. The work of this committee shall be to find out, as far as possible, the isotherm in which each race is adapted.

"4. The committee may recommend to as many stations as may be thought necessary a list of varieties from the races, to test and report upon.

"5. The committee shall make out a suitable blank to be printed by the United States Department of Agriculture, and also to be distributed by this department to the stations engaging in the work.

"6. Each station will be asked to pay for its own trees.

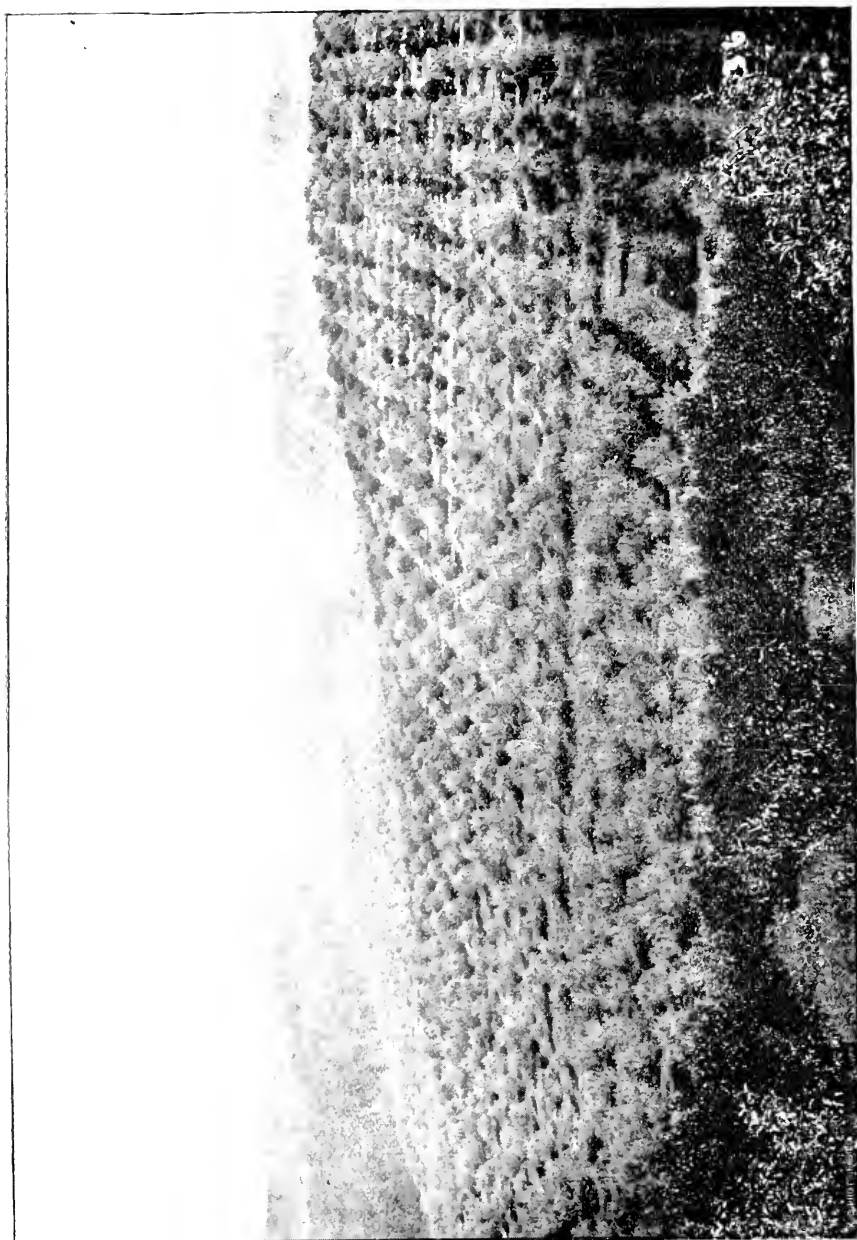
"7. The results of this work, together with the description of the races will be written up by the committee, and will be published by the United States Department of Agriculture.

"After being read, the memorial was referred to a committee consisting of Prof's. Goff, Mason and Munson. The recommendation of the committee was that the following named gentlemen be made a permanent committee to carry on the co-operative work of testing the several races of peaches in the various sections of the United States. The permanent committee is as follows: Prof. R. H. Price, Texas; Prof. B. J. Wicson, California; Prof. G. H. Powell, Delaware, and Prof. L. R. Taft, Michigan."—American Gardening.

PEACH GROWING.

The cultivation of the peach is just now attracting some attention in New England, owing in a large measure to the success of Hon. J. H. Hale, of Connecticut, and a few others, but much more might be done in other sections where none are now grown.

I remember that when I was a boy, almost every garden had a few peach trees. At home the appetite of two vigorous growing boys could not consume all that fell from the trees. If we called on any of our school-mates, we sampled a few of their peaches, and then they came over to see if ours were not better. If an unlucky or unthrifty neighbor had none at home, they could come to our garden or go to many others in the neighborhood and pick up a basketful when they pleased.



A YOUNG PEACH ORCHARD.

And many of those trees were healthy and vigorous at 20 years old or more, and bore nearly every year. Some were 20 to 30 feet in height, and from four to six inches through the trunk.

Yet, in that whole region now scarcely a peach tree can be found, and those who helped us eat those peaches, if alive (alas, how few could now be found), would assert that peaches could not be grown there.

Why is this, and if peaches can be grown as easily as they could then, why have the trees disappeared, and if new ones have been set in their places, why have they died in a few years, yielding only one crop, and often not that?

I have my opinions upon these questions, and propose to give them before I close. It is not because those trees were natural fruit, and therefore hardier than the varieties of today, for while there were some such, many were of budded stock, and of such sorts as are even now considered among the best standard varieties. Early York, Early and Late Crawford, Halis, Melocoton, Old Mixon, both freestone and clingstone, are among the varieties that I knew nearly a half century ago as vigorous and productive, and for a family garden at a nearby market they cannot be much excelled today.

It is not because the soil was new then, because some of those old gardens had been in cultivation more than two hundred years before I was born; but in those days the gardens were not manured altogether with the heating manure from grain-fed horses. The manure was usually a compost of all the contents of the barnyard, where from three to six cows were kept for every one horse. People then burned wood instead of coal, and the ashes was used, either leached or unleached, upon the cultivated fields, furnishing in manure and ashes, potash and phosphoric acid with but little nitrogen.

Then, too, there were many trees of natural fruit, small, not of first quality for eating or even for cooking, late in ripening and the trees hardy in their native soil. It was from the seed of such peaches that the stocks were grown into which were set the buds of better varieties, and the stocks imparted something of their native vigor and hardiness to the tree. There were also native fruit known as the Rare-ripes, which would usually produce the same from seed, and required no budding to produce fruit which then was classed as of first quality for home use, though not firm enough for shipping far to market.

The manure used around the trees or on the crops grown among them was not calculated to force a rapid or a rank growth of wood, too tender to withstand the cold weather, nor was it applied in the fall to stimulate growth as soon as the ground thawed in the spring, or

possibly during the "January thaw," which was supposed to be a part of the regular programme for the winter, and thus the danger from winter killing was lessened.

That mysterious disease, known as the "yellows," had not then become prevalent, as it did later on, to the destruction of many fine trees.

Much has been said about the change in our climate, and it does seem as if we had not as many deep and long-abiding snow drifts as I used to wade through when I attended school in those days, but if there has been a change the peach tree has flourished in some sections despite it all, and I believe it will do so now if it is properly treated. If the conditions spoken of above can be reproduced, and the care in all other respects which is necessary is given, the farmer can have peaches to eat and to sell, and his wife can have them to can, without being dependent on the Delaware and Michigan peninsulas, or paying tribute to the commission merchants of New York and Boston or to the dealers nearer home.

And more important than the saving of commissions will be the privilege of having fruit thoroughly ripened on the tree, and freshly picked, instead of the partly ripe, partly rotten fruit that is now palmed off upon buyers.

In a future article I will give a few hints not entirely from my own experience, but from the best authorities upon successful peach growing.—Ames, in *Amer. Cultivator*.

AMONG THE PEACHES.

During the warm weather prevailing in December, I ventured the opinion that, with the manifest swelling of the fruit buds, if the usual cold weather of January prevailed, the injury that would follow would cut short the crop for 1897.

The low mercury of the early part of last week induced considerable anxiety upon the part of the peach-growers of this vicinity leading to a careful investigation of the condition of varieties; and I find my predictions in a measure confirmed, with more or less damage to all orchards upon low grounds, while those well elevated have escaped reasonably well.

The fact, however, has been demonstrated beyond question that the true policy for the peach-growers of western New York is to plant varieties of known hardiness, as an insurance against climatic conditions that cannot be controlled if this department of fruit-growing be ac-

accompanied with satisfactory results. The Michigan growers have made this a cardinal feature of their work, hence their success. With them the first question is, "Is the variety hardy in the fruit bud?" If not, we have no use for it.

I herewith submit a statement of the condition of varieties examined today in my orchard, suggesting that all of the Crawford type suffered in the greatest degree, in many of which all buds were killed outright, while enumerating a list found in fairly good condition. The larger portion of this list is among those regarded as standard and reliable sorts grown in Michigan, while as a rule they have not found a place in New York orchards. The field is one of interest, and it is possible we can learn much of value from our friends on the shores of Lake Michigan. Varieties marked good are those in which scarcely an injured bud could be found, while two-thirds and one-half indicate respectively the amount of uninjured buds counted upon the branches cut and examined with care:

Hill's Chili, Golden Drop, Kalamazoo, Salway, Tyhurst, Hynes Surprise, Lewis Seedling, Horton's Rivers, Early and Wheatland are classed as good; Crosby, Red Cheek Melocoton, Morris White and Elberta, two-thirds; Steven's Rareripe, one-half.

For years the old Red Cheek Melocoton has shown itself as the most hardy of all of the Crawford type. A peach well known and popular years ago and yet today scarcely recognized. Have we not in our haste to make the acquaintance of new candidates for public favor made the mistake of overlooking varieties of greater merit?—S. D.W. in Country Gentleman.

PRUNING THE PEACH.

It is seldom one hears much about the pruning of the peach. It is usually the apple or the pear that is spoken of or written about. It is true that it is not such a universal fruit as the others mentioned, as it will not succeed in all situations. Still it is one fruit above all others in some places, and in many city gardens room is found for a peach or two, where spreading trees like the apple cannot be accommodated.

It is the fashion to believe that there are localities where peaches were once grown in which they will not now succeed, but if there are those who cannot make them grow in such places it is more probable that it is because of exhausted soil than from any other cause.

It is too often the sight now to see peaches set out in newly cleared land, with no manure at all given them. The trees grow well enough for two or three years, until what little food the ground con-

tained has been exhausted. Then yellow leaves appear and stunted growth, just at a time when extra food is required in anticipation of the calls crops of fruit will make.

A great deal of the difficulty experienced in keeping peach trees healthy comes from starved trees. Peach trees may be planted either in the spring or fall. One year old from the bud is the proper kind to get. If the trees are pretty well branched, as they sometimes are even when so young, it is best to prune them in pretty close. For orchard purposes, high-branched trees are not desirable. It is better, therefore, to aim for low-branched ones, and these can be had by heading the trees back when planting them, leaving them when set to be about five feet high. Branches will push out for a foot or so below the top, leaving the tree branched from about four feet up. It is easier to gather fruit from such a low branched tree, and less fruit is blown off in gales, besides that the ground is more shaded from the sun and is cooler than under the other system.

As the trees grow year by year they should get a little pruning annually. It is too much the fashion to let the branches form and grow as they will, resulting in trees with long branches, the fruiting twigs on the extremities, and the inside limbs bare of twigs of any kind. This need not be. If a little pruning be given every year there will result model trees, with twigs from top to bottom of the branches, which will bear fruit. What is required is to keep up a little shortening in every year. This can be done when the tree is growing as well or better than at any other. The end nipped off from a growing shoot will result in the formation of perhaps three or four where the one was.

When shortened in winter the number of new shoots is not increased perceptibly, hence the desirability of summer pruning. Trees pruned in this way never require any heavy cutting of branches, consequently there are no scars to be painted, and as the trees grow they seem to increase in beauty. They become of good outline, are clothed with blossoms from bottom to top in spring, and afterwards are laden with fruit in the same way, very different to the average peach tree generally seen.—Practical Farmer.

CLASSIFICATION OF VARIETIES OF PEACHES.

That there are well-defined types of peaches which behave differently in different latitudes is well-known, and some knowledge of the classification of varieties as affected by climate is necessary, not only to the practical grower, but to the scientist as well. The peach has been

so modified by climatic influence and crossing of the different types that it is difficult to devise a system which will include all varieties and not be subject to some criticism. But if a system can be devised by which one can distinguish a large number of varieties and predict within a reasonable degree of certainty which types are likely to succeed in a given section, a long step is made in the direction of most valuable knowledge.

There are types coming from China, Japan and Java, and others which are now being built up in the southern part of the United States, which the above points do not distinguish with clearness. We have seedlings from the Honey peach which came from China in 1854; seedlings from the Peen-to, which came from Australia in 1869; then, again, there are seedlings of the Spanish or Indian type, all of which are adapted to more southern latitudes than those of the Persian strain, which constitute the bulk of northern orchards. These new types are proving valuable along the Gulf states, where the peach has not been grown as successfully as it has farther north. It is important now that the botanical characteristics of each type (which we shall call race for a better term) should be recorded with clearness, and the climate in which each grows best be pointed out.

From what I have thus learned it seems to me that what is known as the "Onderdonk classification" is the best. An outline of this scheme appears in the report of the United States Department of Agriculture for 1887, page 648. Some of the distinctions made in this classification cannot be noticed with decisive clearness a few hundred miles farther north, but in the semi-tropical climate of the coast region the characters are striking. This at once indicates that the different races originated in different degrees of latitude and at different altitudes. These facts are further substantiated by botanical characteristics. We divide the peaches now cultivated in the United States into five races: (1) Peen-to, (2) South China, (3) Spanish or Indian, (4) North China and (5) Persian. By race is meant "a variety so fixed as to reproduce itself with considerable certainty by seed."

Seed characteristics.—The shape, size and corrugations of the seed are so well marked in the more distinct representatives of the different races that after a little practice one can distinguish them apart by this means alone.

The seed of the Peen-to is nearly round, much compressed at the ends, corrugations small and somewhat rounded. The seed of the Honey is oval, with apex slightly recurved, corrugations slight, prominent flange on one side. Seed of Spanish is large, oval, nearly flat, apex prominent, corrugations very long and wide, at the base they run

more longitudinally than in any other race, flange on one side often prominent. Seed of North China is nearly round, very thick, corrugations rather slight and irregular, apex rather prominent. Seed of the Persian is somewhat round, more flattened at the base than any other, corrugations prominent toward apex, but very seldom extend to base, apex more or less prominent. A resemblance can be seen between the Spanish and Persian, and as there is no definite history in regard to the origin of the Spanish it is probable the types had the same origin. The Indian type of the Spanish can only be distinguished from the Persian in many cases by the heavy down on the fruit, which is characteristic of the Spanish.

THE DIFFERENT RACES AS AFFECTED BY CLIMATE.

I. *Peen-to* (*Prunus platycarpa*, *Decne.*). Tree rather large; branches vigorous, willow-like, branching at an angle of about forty degrees; flowers large, opening early, frequently in January in the Gulf states, often at a low temperature and very irregularly; leaves narrow and long, inclined to be evergreen; fruit much flattened; skin white and mottled with carmine; flesh white; flavor sweet, with peculiar almond tang. It is adapted to the northern part of the citrus belt, in which climate it ripens from May 1 to June 1. It has a tendency to sport, and some valuable varieties are now coming from it for the extreme southern part of the Gulf states where other races will not grow successfully.

II. *South China Race*.—(The parent of this race is the Honey peach, *Prunus Persica*. B. & H.) Tree medium sized; branches leaving the trunk at an angle of about fifty degrees and curving upward; buds quite prominent; flowers always large and very abundant, with greater resisting power against cold than any other race tested in this climate; has borne crops annually during the past four years, when many other varieties belonging to different races failed; foliage small, slightly conduplicate, distributed all along the limb, color dark green, in fall slightly tinged with red; requires short season of rest; fruit rather small, somewhat oval in shape, slightly flattened, suture very deep at basin, but does not extend more than one-third the way down; apex long and recurved; flavor peculiar, honey sweet. Supposed to have originated in southern China, from which the seed came. This race is adapted to more southern climates than any other, except the Peen-to. Honey seedlings are proving very valuable for the southern Gulf states.

III. *Spanish Race*.—Tree very large, except in Indian type, which evidently has considerable Persian blood, judging from the color of

the young wood, which is reddish, the naked places on the bearing wood and the corrugations on the pit and its general shape; limbs large, long and spreading; branches low and drooping; flowers nearly always large; leaves small and flat, persisting late in fall and turning slightly yellow; fruit very decided in character, ripening very late, nearly always yellowish when mature, and covered with heavy down; in the Indian type the fruit is striped with red; a heavy bearer and sure cropper in its proper isotherm. Seems to have come from the Indian type brought over from Spain by the Spanish missionaries and distributed among the Indians of the extreme Southern states. Perhaps it is owing to successive seedlings in more favorable climate that the type is now varying. All over the Southern states one hears the expression that seedlings are surer bearers than budded trees, and there seems to be some truth in this belief, because by growing seedlings continuously varieties may adapt themselves to climate. This type is adapted to isothermal lines north of where the South China race flourishes.

IV. *North China Race*.—The original Chinese Cling, which is a drawf tree near the coast, is the parent of this race. It is not at all adapted to regions along the gulf. Two or three hundred miles farther north it and its seedlings do well. It is the parent of the largest peaches in the United States; blooms later than the Persian, and the flowers are nearly always large; foliage large and flat, turning toward autumn in the Southern states to a peculiar pea-green, and this type among others in an orchard can be detected with ease by this means alone. The color of the foliage foreshows the color of fruit, as none of the seedlings, as a rule, are highly colored. The parent came from China, and it is adapted to zones farther north than those suited to the Spanish.

V. *Persian Race*.—Tree medium size to large; limbs short and thick, with long naked places; bark usually rich purplish red on young wood; flowers large or small in different varieties; foliage crimped and conduplicate, with purplish tinge before falling, which happens early. This race requires a long period of rest, which indicates that it has had a more northern origin than any other, supposed to have been Persian. The seedlings now form the bulk of northern peach orchards. Fruit usually the most highly colored and of the finest flavor. In this race we sometimes find a variety with yellow flesh, but the flavor is not as good as the others. It is almost useless to plant this race in the southern part of the Gulf states.

There are some ornamental varieties, which will not be mentioned here.—R. H. Price, Experiment Station, College Station, Tex.

THE PLANTING OF PEACH TREES.

Just now I see going the rounds of the papers that "all peach trees should be cut back to a switch 18 to 36 inches." This is the instruction given by nurserymen 40 years ago. Will nurserymen never learn anything? Cut back to a switch, indeed! If you go to these same nurserymen, they will ask you more than double for their larger trees, then tell you to cut them back to a switch. Bah! What nonsense. When you buy peach trees for planting, purchase small sized trees. Why? Because you get a multitude of fiber roots, as well as perfect tops, that do not require cutting back. I believe a small peach tree, say two or three feet, is preferable to a larger one. They cost only about one-half as much; the limbs are small and are seldom broken, and the roots are in good shape. You do not have to lose one year in shaping your tree. I have trees planted two years of stock from two to three feet with the leader cut back after the first year, that are fully eight feet high and as much through the limbs. They had cultivation and soil, I admit, but then they were of the class of trees mentioned. Give me the plant; I will make the tree.—F. Holsinger, in *Western Fruit Grower*.

THINNING OF PEACHES.

David Baird read a paper on "Thinning of Peaches," giving some of his experience. The peach crop the past year in this State set very thickly, and three-fourths of the crop taken to market did not pay expenses; had they been thinned fully one-half, the rest would have been a paying crop. He thinned soon after the June drop began, leaving no two peaches touching each other. The proper distance in thinning is to leave no two closer than six inches apart. This refers to all fruits as well as peaches.

One member spoke of thinning peaches in his orchard, thinning one large tree twice, taking off 1,950 the first time and 450 the second time. He afterwards gathered 15 baskets of fine peaches from the tree, and said he is fully convinced that if he had not thinned he would not have had three pints of perfect fruit, besides greatly injuring the tree. Mr. Taylor recommended heading back the young wood of the tree fully one-third or one-half, instead of so much thinning; this will cost much less and prove much more satisfactory. This can be done after

danger of freezing is past; the best time is after the bloom has appeared.

Mr. Baird said: A quarter crop is better than a full one, as there is more net profit for the grower, so you should thin hard; besides you obviate the danger of spoiling your trees.

Prof. B. D. Halsted spoke on the forcing or prematuring of peaches. This is a disease of the tree; in some cases, a single limb will force or ripen its fruit prematurely, while the rest of the tree will be in a normal condition. The professor thinks this condition is largely caused by the borer, as those which were forcing the most were affected by the borer to a great degree. In some cases, fruit which should ripen in October, was being picked in a ripened condition with the early varieties.

The unusually wet weather early in the season, followed with extreme heat, is thought by many growers to be the cause of the forcing the past summer, while in other cases the yellows of the peach trees seems to have much to do with the prematuring of the fruit. For this disease there seems to be no absolute cure yet discovered, so far as we now know. To cut out and destroy all trees as soon as discovered, destroying everything, root and branch, is the best remedy, by preventing its spread.

Mr. Johnson said: There is more danger from peach pits taken from trees affected with yellows being planted and these young trees, being set in poor land, developing the disease, than in any other way. Growers and nurserymen should be very careful where they get their pits, from which they grow their young trees.

How early should peach orchards be plowed in spring?

Mr. Black—Just as early as the soil is in good condition.

Some of the new fruits mentioned by members of the society were the Triumph peach, Greensboro and Champion, the latter one of the best of later introductions. Kansas raspberry, a black variety, the Miller raspberry, a red variety, a very good shipper, in color and solidity far ahead of the Cuthbert; Early Queen blackberry ripens earlier than Early Harvest, a very promising sort; Lovett and Tennessee Prolific strawberries, both good varieties, also the Wm. Bell, a good family berry, very sweet and of good quality and flavor.—New Jersey Horticultural Society, from Country Gentleman.

INCREASE OF INSECT ENEMIES.

It needs little argument to prove that the enemies of cultivated plants are steadily increasing, and I think it can be easily shown that they will continue to increase so long as the conditions, for which we are in large part responsible, remain as they are at present. I do not by any means regard this as a calamity. On the contrary, I look upon the fact that our insect and fungous foes are increasing as direct proof that we are progressing, for, as Professor Bailey has said: "Our enemies increase because cultivation induces change of habits in wild organisms; because it presents an ever-increasing variety of food, or host plants; because the food supply is large and in more or less continuous area; and finally, because the natural equilibrium, or tension, is destroyed." It follows, therefore, that the more we put forth our energies to improve our native plants or to change their habits; the more we endeavor to increase the variety and number of our cultivated vines, trees and shrubs; the more we extend our orchards, our vineyards and our fields, just so much more do we disturb the equilibrium in nature, and just so much more must we expect to burden ourselves with the work of maintaining this unstable condition by more or less artificial means. Where an insect or fungus had one chance a hundred years ago to wax strong and spread, it has now a thousand chances, for unbroken orchards and vineyards and millions of nursery trees cover the country where then only wild plants grew. It is but natural, then, that man, seeing the onward march of his enemies, should look about him and wonder how it will all end, and how he, as an individual, is to obtain relief. In many cases he has found a way of doing this by adopting certain more or less empirical methods. Again, with a fuller appreciation of the fundamental principles underlying plant growth, he has learned, partly by intuition, to keep his plants in health, and when he has reached this stage he stands far in advance of his neighbor who waits until his plants are diseased and then begins to look about for a spraying apparatus.—B. T. Galloway in *Farmers' Review*.

THE SAN JOSE SCALE AND ITS PARASITE.

The so-called San Jose scale (*Aspidiotus perniciosus*) which is now carrying terror to the fruit-growers of the East, owes its introduction in this country to a pioneer of California and a former resident of

Chili. After acquiring wealth, he established handsome grounds in Santa Clara county, which is stocked with various imported plants, and it is supposed that this scale was imported from Chili by him in the early seventies, for soon after this it was noticed, and spread with great rapidity over the greater part of California. The fact that it appeared soon after the importation of South American plants and was reported from Chili at the same time, leads to the belief that it is native of that country, although some entomologists believe it to be of Japanese origin, from the fact that nearly related species are found there.

For awhile it was indeed a terrible pest to the fruit-growers of California, and no efficient means were found to check its spread. Spraying with various substances and at different seasons was resorted to, but nothing man could do could stop its spread or stay its ravages. Nature, however, came to the rescue and a small internal parasite (*Aphelinus fuscipennis*) was discovered working on the pest. This parasite has increased in California more rapidly than the pernicious scale, and the latter is now very generally held in check. There is no hope that it will ever be exterminated, but during the past seven years the scale has decreased so rapidly that it is no longer regarded as a serious pest in the orchards of California. We believe that the *Aphelinus fuscipennis* is found in many parts of the Eastern and Southern states, as it works on other scales than the pernicious, and it is probable, as it is to be hoped, that it will become established in sections afflicted with this pest.—Prairie Farmer.

A SCALE DISEASE.

It is now well known that some of the most tiny insects are subject to diseases, and that these are often employed in the destruction of insects which are injurious. The artificial dissemination of the chinch-bug disease has been a notable example of this. It now appears that there is a fungus which attacks the San Jose scale. This particular fungus is said to have a wide distribution, but has only recently been recognized as a deadly enemy of the pernicious scale. To produce the disease among the scales the fungus is transferred to the affected trees where it multiplies rapidly.

Prof. Rolfs of the Florida Experiment Station reports that large quantities of the fungus may be produced in the laboratory in a short time and at slight expense, its wide distribution rendering always available a start for propagating. It can then be applied by the grower, and as far as tested has been more effective than many spray-

ings. If this remedy fulfills the expectations concerning it, the dread scale will be more readily overcome. It is predicted, however, that the disease will be less effective in dry than in moist climates.—Agricultural Epitomist.

Dr. Cotton said that Mr. C. D. Elliott had sprayed most of his orchard with a one-fourth of an ounce of chrysal carbohic acid in 50 gallons of water for bitter rot with good success. The spray was applied in July or August, and parts of the orchard not sprayed suffered with bitter rot, while the part treated was comparatively free from the disease. If this remedy continues to prevent the bitter rot it will be worth thousands of dollars to the apple orchards of Benton county.—Report from Benton County, Ark., Horticultural Society, December 1897.

STRAWBERRY RUST.

This is a fungous disease which injures some varieties more seriously than others. Most of the larger strawberry growers in Vermont avoid serious difficulty from rust by frequent resetting of their beds, taking only two crops of fruit, then plowing up. Where they keep them longer and the rust begins to trouble, the best preventive is spraying with Bordeaux mixture—the same remedy as used for potato blight. Spray at least three times, once as soon as convenient after the berries are harvested, again later in the summer as the new plants are well developed, and again the following spring before fruit is set. If disease is very bad I should advise two sprayings in addition to the above, one more in the fall and one earlier in the spring, making five altogether. In addition, it is a good practice to mow the bed after picking, and rake off and burn the old leaves, which destroys many of the rust spores.—L. R. Jones, Vermont Experiment Station.

BORERS.

In writing to The American Agriculturist on "Winter Work Against Insects," Professor J. B. Smith calls attention to the fact that many borers pass the winter as larvæ either in dead or dying twigs that remain on the trees or have fallen to the ground. All dead and dying wood should, therefore, be removed from orchards in the winter. Almost every dead or dying branch contains borers in some stage, and these should find their way to the brush-heap or into the

stove before spring. If they are put on the brush-heap they should by no means be allowed to lie till the following summer, but ought to be burned before the first of April. Careful inspection at this season may show on apple trees which have been infested with plant lice many very small, shining, black, oval eggs close to the buds near the tips of the twigs. It is hard to kill these eggs, but if there is any trimming to be done these twigs may be cut off and burned before spring, and this will lessen the insects for next year. The egg belts of the tent caterpillar are more readily seen, and it pays certainly to cut them from medium-sized trees. Burning over infested land in winter will destroy the eggs of many grasshoppers and other insects which lay their eggs in the leafy tissue or on the stems of grass or weeds. Some insects which infest shade-trees, like the bagworm and the vaporer moth, hibernate in the egg state. The bagworm can be easily cut off of the tree, especially the Arbor Vitæ, which is very subject to their injuries, while in cities and towns the egg masses of the vaporer moth are found on fences, tree-boxes and any other place where a little shelter is afforded, and since each mass contains more than a hundred eggs, every one gathered and burned helps to limit the injury from caterpillars the next year.—Garden and Forest.

BOILING WATER FOR YELLOWS.

An Early Crawford peach tree in the western part of Rochester, N. Y., says the Democrat and Chronicle, has borne three bushels of fine fruit. Two years ago the tree was smitten with the "yellows," and the owner thought it was doomed, but following the advice of a friend who had tried the remedy, he poured boiling water on the trunk and branches and threw it on the upper limbs, repeating the operation four or five times at intervals of five or six days. New growth soon started, and the tree was shortly covered with green and healthy foliage.—Country Gentleman.

EFFECTIVE PEACH SPRAYING.

From observation of the past few years, Director A. T. Neale, of the Delaware Agricultural Experiment Station, recommends the following plan in the treatment of peach orchards. 1. Spraying heavily with Bordeaux mixture just before the blossoms open. 2. When the fruit has set, spray again, to which add Paris green at the rate of 3 oz. to the bbl. 3. When the fruit begins to color, spray with the copper acetate solution, 8 oz. to the bbl. 4. Repeat this in from one to two

weeks if the weather is damp and conditions favorable for rot. Last year Hale's and Early Rivers peach trees were sprayed for the second season with the Bordeaux mixture. The results show, first, that spraying will increase the amount of sound fruit from three to four fold; second, that while a year ago spraying after the fruit reached the size of large peas did not diminish the amount of rot, such was not the case last year, owing to the rainy season at the period of ripening, trees sprayed at the period of coloring showing less rot than those not sprayed at this time; third, that trees sprayed ten days or two weeks after the beginning of coloring did not effect additional diminution of the rot; fourth, that a rational and effective plan for treating peach orchards for rot would be to spray three times—just before blossoming, after the bloom has entirely dropped and at the beginning of coloring.—Orange Judd Farmer.

PEACHES WITH "WILTED BLACK SIDES."

P. L. B., Dresden, O.—Our Salway peach orchard, six years old, has borne two crops. I think the ground is too rich, as the peaches grow large, but are not perfect: they have wilted black sides, do not color well, and are inclined to rot badly. The trees have made a strong growth, and are large. The land, before being planted to peaches, was used for sheep pasture, and being the highest ground in the field, was where they lay at night, which made it rich. It is rather new ground, has not been farmed very much, but has been cleared long enough for the stumps to be all gone. It is damp, but no water ever stands on it. Since being planted to peaches, it has raised two crops of corn, and since that, has been in grass and weeds for its second crop last summer.

Answer—It may be that the soil is too rich in nitrogen for the best development of the fruit of the peach, but, if so, it is from too much sheep manure. But the chief trouble, probably, lies in the fungous diseases which have preyed on the fruit. The "wilted black sides" are, in all probability, the result of a disease which is often called "peach spot," and comes from numerous colonies of a microscopical fungus, each being a spot much like a fly-speck, and together forming a dry, scabby appearance on the surface of the peach, and a stunted growth of that part of the fruit. Sometimes exceedingly hot spells and protracted growth cause a lack of normal development on the side next the sun. These troubles were quite common in many parts of the country the past season. "Peach rot" is the result of another fungus which finds the most favorable development in warm, wet weather. The remedy for these diseases is the burning of the remnants of diseased fruit left in the orchard at once, and repeated spraying with fungicides, in accordance with specific printed directions, which should be procured without delay from the State Experiment Station of Ohio (at Wooster), or, in case of trouble in other states, of the State Experiment Stations.—H. E. Van Deman, in Rural New Yorker.

NOTES ON CHERRIES.

About ten years ago several varieties of cherries, chiefly European importations, were received from Professor J. L. Budd, of Ames, Iowa, and planted on the experimental grounds here. Most of the trees have fruited for a number of years, but very little has been published concerning their behavior in this climate. The soil on which they were grown is a heavy sandy loam underlaid with gravel.

As would naturally be supposed, the trees are all perfectly hardy, and have made a good growth. Of nineteen varieties which fruited during the past season only a few possess any superiority to our older cultivated varieties, which would warrant a more extended trial. The greater portion of them are in no way better than the old Early Richmond. The following notes were taken during the fruiting season, and are given here for the benefit of those who may wish to plant some of these varieties.

Brusseler Braune makes a larger tree than Early Richmond, and has shown itself to be a heavy bearer. The fruit is large and nearly black when fully ripe; stem two inches long; flesh firm, juicy and of fine quality; juice highly colored. It ripens about June 25th in this latitude, and is one of the most promising varieties in the list. Montmorency probably stands next, with its large, bright red, showy fruit. In productiveness it equals the Early Richmond, but ripens ten days to two weeks later.

Lutorka is a large, bright red cherry with a deep suture, with firm flesh and of good quality, ripening about June 10th. This variety has received favorable comments from growers in the east as promising. So far, with us, it has been a very shy bearer; otherwise it would be recommended for general planting. Griotte du Nord is a good tree, with fine foliage. The fruit is large, almost black when fully ripe; stem two inches in length. It resembles the Brusseler Braune in general appearance, but ripens a little earlier.

Dye House has been spoken of very highly in some localities, but with us it is only medium; no better than many others. French Morello is a large, dark red cherry of good quality and quite productive, ripening about June 25th. Montmorency Extraordinary is of medium size, bright red, good quality, short-stemmed, and ripening June 10th. Fruehe Morello is a large, bright red fruit, of fine quality, short-stemmed, quite productive, and ripening June 8th. Spaete Morello is a good bearer; fruit medium in size, dark in color when fully ripe; the

skin is tough, making it a good shipping variety; ripens June 25th. Wragg makes a low-spreading tree, with fruit of medium size, dark red, and of very good quality when fully ripe; ripens June 25th. Weirs No. 2, inferior and not recommended for this locality. Bessarabian would be a fine variety if it were more productive, but thus far it has produced very sparingly; the fruit is large, dark red and of good quality, and ripens about June 20th. Cerise de Ostheim is a round-topped tree, the branches somewhat pendulous in growth; it seems to be one of the best varieties of its class that we have fruited; the fruit is medium in size, of a dark color when fully ripe; flesh, firm and tender, juicy and rich, and the tree yields a heavy crop every year. Frauendorfer is a strong-growing tree, with large dark red fruit, tender and juicy; as yet it has not been prolific enough to warrant us in recommending it for general cultivation. Carnation is a sweet cherry of great promise; the fruit is very large, bright red, rich and meaty; it ripens about June 8th, and is a most excellent variety for family use.—J. Troop, Lafayette, Ind., in Garden and Forest.

CHERRY TREES.

Most farmers would find it better and cheaper to purchase cherry trees of some reputable nurseryman than to attempt to grow the stocks and bud or graft them. As this is contrary to the advice given for other trees, I will give my reason for it. The nurserymen have little or no difficulty in procuring seed from seedling trees which have not been grafted, such as will make the best stocks, or from those in which the buds did not live, and it requires more skill, or at least more care, to successfully bud the cherry than the peach or plum, owing to the liability of the bark to peel off and curl away from the bud or scion.

There are some kinds which will grow true to the parent stock from the seed, with only occasional sports, and upon them and not on budded trees do the growers depend for their seeds.

The cherry will grow like the plums upon almost any soil unless very wet, but likes best a deep, rich loam. The different varieties vary somewhat in this, as they do in their habits of growth. Some sorts upon strong and rather moist soil will spread their limbs until they would touch at 50 feet apart, while others grow more upright and would not touch at 15 feet apart. Where land is plenty we should give abundant room, preferring to have as much of a low, wide-spreading tree as we could get, while close planting would have a tendency to make upright growth. In a village lot I have seen them growing

well at a rod apart, and I have seen a 50-year-old tree standing alone covering a space more than 50 feet across and loaded with bushels of cherries.

Yet the tree should not be heavily manured while young, as most of our varieties are rank growing, and, therefore, rather apt to winter kill at the ends of the branches, and even sometimes to be injured by extreme hot weather after a rapid growth in the spring. Heavy manuring may also result in overbearing, sacrificing quality to quantity of fruit, more setting on the branches than can grow to good size. A steady and regular growth is better than a rapid one.

It is well, at least while the tree is young, to cut off the ends of the limbs each fall after the leaves drop, taking nearly one third of the season's growth, as it bears only in wood two years old or more. This and cutting out dead branches is all the pruning the cherry tree needs.

Like other stone fruits it requires a fertilizer or manure rich in potash, but it will bear more nitrogen also after the tree has attained a good growth.

Although the tree is sometimes troubled by caterpillars and canker worms, they will not often trouble the cherry if they can find apple trees to feed upon, and they can be kept away by spraying with some of the arsenical poisons when they are found upon the tree. The fungous disease, which sometimes causes the fruit to rot upon the tree before it ripens, is a worse enemy than any insect. To guard against this, spray with the solution of sulphate of copper in the early spring before the buds start, using it very strong. After the blossoms have fallen, spray again with same, but using a weaker solution, not more than two ounces of sulphate of copper in a hundred gallons of water; repeat about once in two weeks until the fruit begin to ripen. If so much spraying is troublesome, it is also vexations to fail to find any cherries fit to eat or to cook after watching a good crop grow. Spraying seems to be almost a necessity now, if one would have good fruit of any kind, and if others spray, there will be no market for any but good fruit.

The curculio sometimes attacks the cherry, and if abundant it may be necessary to either add an arsenical compound to the spraying mixture after the fruit has set, or fight them by jarring off and burning. There is also a slug which attacks the leaf in some sections that may need to be destroyed by spraying.

As regards varieties, one may take his choice of those which are so acid as to be almost unsuitable for eating excepting when cooked and well sweetened; those that are so so sweet as to have almost a sickish taste to some, or a milder flavored fruit that a few like, but

which is to me about as insipid as a piece of chalk. Catalogues and nurserymen will give full information in regard to them if one wishes to buy trees. If budding or grafting for one's own use, scions can be taken from such varieties as have been tried and proved good.

The beautiful form and the flowers of the cherry make it a desirable ornamental tree near the house, and I would advise every farmer to have a few. Have enough to furnish fruit for family use and a surplus for the birds. They are particularly fond of all but the very sour varieties, and will be apt to rob a single tree, so that its owner can get but little well-ripened fruit from it.

But the service they do in destroying insects in the orchard and garden is well worth the trouble of setting a few fruit trees for them.

The cherry tree usually does better in a northern exposure than upon the south side of a hill or building.—Ames, in *American Cultivator*.

HOW TO GROW CHERRIES.

Cherries thrive in a variety of soils, but attain their highest development in one that is light and loamy. It must retain considerable moisture, but never be sour. If the land is too wet it must be drained, and on light, dry knolls, otherwise favorable to cherry culture, the moisture-holding capacity of the soil may be increased by the addition of vegetable matter and judicious surface cultivation. The turning under of crimson clover or a crop of similar character is highly beneficial.

The best results are obtained from orchards situated on a western or northwestern slope, as the blooming period is retarded in spring and the danger of frosts greatly lessened. A depression is not desirable, as frost is liable to occur there when it would not on higher ground. Where the country is naturally level, a slight elevation is preferable, since it assures air drainage and good circulation. The sour varieties of cherries seem to thrive better on lower levels than the sweet kinds.

The distance apart for planting trees will depend almost wholly upon the manner of growth. Some trees may attain a height of 40 to 50 feet and be wide-spreading. These should stand not less than 30 feet apart. In western New York the sour varieties with small heads are set 12x12 or 18x18. For instance, the Montmorency and Early Richmond are usually planted 18x18, while the more bushy and compact Morellos are planted 16x16.

The highest success in cherry-growing cannot be attained without thorough cultivation during the early life of the orchard, and also later

while fruit is being matured. There is no objection to growing small fruits or some other crop requiring frequent cultivation between the rows of cherry trees for a few years, provided the land is good and contains enough plant food to keep the trees in vigorous condition.

The sweet cherry is a coarse feeder and will thrive on less applied fertilizer than the other kinds. (G. Harold Powell, Bulletin 35, Delaware Experiment Station.) When the land is too rich, or too much fertilizer is added, the energy of the tree is apt to be devoted too largely to wood growth. An abundance of moisture is essential for cherry trees during the bearing season, especially just before and during the ripening process, consequently it is advisable with a bearing orchard to plow early in spring and follow with light cultivations every ten days, or whenever the rain becomes scarce. On the first or middle of July the condition of the soil can be greatly improved in its water-holding capacity by turning under annual crops of crimson clover or some other nitrogenous cover crop. In order to secure this crop, sow at the last cultivation 10 or 12 pounds of crimson clover seed per acre. It is very essential to retain the moisture in the soil in the spring by early plowing and by quite frequent culture. If the trees make too vigorous a growth, seed down one year to rye or buckwheat.

The most profitable sour cherries are the Montmorency and Early Richmond, and these varieties can be grown in nearly all the orchard fruit regions of the United States. In the eastern states the following sweet varieties have been grown with more or less success: Black Tartarian, Robert's Red Heart, Napoleon, Windsor and Dikeman. For this same region the following may be added for family use: Black Eagle, Mezel, Gov. Wood, Coe's Transparent, Knight's Early Black, Yellow Spanish and Louis Philippe.—Orange Judd Farmer.

THE CARE OF PLUM ORCHARDS.

Any good corn soil will do for a plum orchard in Iowa. Perhaps the very best location is a gentle northern slope. Do not worry about the soil being too rich, and before planting your trees have it plowed deeply and harrow it very smooth. Set your trees in rows running north and south, 16 to 20 feet apart between the rows, and 10 to 12 feet between the trees in the rows. Be careful to select different varieties that bloom about the same time and mix them. This will give more perfect fertilization and abundant annual crops. Plant only varieties of the very largest and richest color, especially if you are planting for market, for size and color will sell a fruit better than quality, although it is desirable if we can combine all these points in

a commercial orchard fruit. For this climate our improved natives are the most satisfactory and profitable to plant. They never winter kill, are almost free from disease and bring us paying annual crops. We now have over 200 varieties of these improved natives to make our selections from, and if intelligently made, we can pick plums over three months in each fruiting season. I know of no tree fruit in this State that yields so abundantly or is so profitable as these fine native plums. I do but little trimming on my trees, but we cannot give them too much cultivation, and during fruiting give them plenty of well-rotted manure; by thorough cultivation and plenty of manure we can increase the size and quality to a wonderful extent. Nearly all our best native plums overbear, hence the fruit should be well thinned out while yet small. If this is well attended to the balance of the fruit will mature large, fine specimens, and after being carefully hand-picked and put in neat baskets, avoiding more than one variety in a basket, we shall have little trouble in selling them in any market at remunerative prices. In making our selections of varieties we should select so we may have fruit during the entire fruiting season. The very earliest are Milton, Wild Goose and Whitaker. The best for medium seasons are Wyant, Chas. Downing, Hawkeye, Stoddard, Hammer, De Soto, Gaylord, Wolf, Beauty and American Eagle. Miner, Champion, Golden Beauty and Fairchild are the most desirable for a late market. If our horticulturists had planted these splendid natives in place of foreign trash the past 20 years plum orcharding in Iowa today would be out of the experimental stage, and commercial orchards would be as plentiful and profitable as they are in more favorable climes. That Iowa has produced so many valuable, large native plums in rapid succession the past 10 years seems a little strange, but if we trace effects back to cause we shall discover such results are not from any haphazard chance, but from a deep scientific cause. Our soil and climate has doubtless much to do in producing this superior fruit, but I feel confident that in the long selection and culture by prehistoric man as well as our present efforts along this line of higher development, lies the true cause. However, I will leave this for another paper.—A. B. Dennis, Iowa, in *Prairie Farmer*.

SEEDLING PLUMS.

Some of the *Prairie Farmer* readers have requested our method of raising seedlings of plums. There are two objects in raising seedlings: One is to get stock upon which to graft or bud valuable varieties; the other is to get valuable new sorts, as new varieties can only be origi-

nated by planting pits. The preparation of the pits and their care till planting time is very important. If seedlings are desired for stock in budding or grafting, the Miner is perhaps the best that can be used, as this variety seems to give us the most uniform and thrifty seedling. This uniformity, thriftiness and extreme hardiness makes the Miner the ideal stock for nursery use. Gather the pits during the fruiting season by squeezing them from perfect fruit, thoroughly cleansing all the meat from them, and pack them away in clean, moist sand till fall. When it begins to slightly freeze, or a short time previous to freezing, plant them on ground that has been plowed and pulverized. If extensive planting is to be done, use the two-horse corn planter to drill in the pits. If only a few seeds are to be planted, make a little furrow with the garden cultivator, and drill the seed by hand. This completes the work till spring. Then we begin to fight the weeds as soon as possible by giving the ground a thorough surface cultivation. The seeds should be deep enough in the ground to admit of this without endangering or breaking off any of the sprouts that may be starting; if the seeds are drilled in three inches this can be done. After the plants are sufficiently large to mark the rows, give good cultivation at intervals till budding time, which usually can be commenced the latter part of July and continued as long as the bark lifts freely. If the young trees are intended to be used in grafting, let them stand until digging time in the fall; then dig and pack away in a cool cellar till wanted. If seedlings are desired for seedling fruit and new varieties, the same care must be used as here given for stock, but still more care must be used in selecting only the very largest and finest specimens of fruit to secure pits from, and not plant so thickly in the rows. It is also desirable to label the varieties of pits so you can have sure knowledge of parentage on one side at least; of course, if natural cross-fertilization has taken place, the new fruit may be entirely different from that out of which the pits were taken.—Prairie Farmer.

GROWING PLUMS SAID TO BE IN ITS INFANCY.

The New York Experiment Station has issued a bulletin on the plum and its culture, which is very timely and interesting. This bulletin says the plum is not well understood in the United States except in Western New York and the Pacific coast. After classifying the varieties the bulletin treats of only the *Domestica* or European plums, embracing Green Gages, Lombard, Bradshaw, Yellow Egg, Damsons, etc. They are treated under four classes—Damsons, Green Gages, Large Yellow and Large Red, or purple plums.

These are less hardy than any other type except the Japanese, but they are so superior in size and quality that they will continue to be more largely grown in New York than any others, till a new collection of hybrids is raised up to surpass them.

As a market fruit, the plum is of secondary importance, classing after apples, pears and peaches, and even after cherries and berries. While it thrives on a variety of soils, it prefers a clay loam. As a stock, the Myrobalan is most largely used in the Northern states. In the South, the Peach and the Mariana are preferred as stocks upon which to bud plums. A few such varieties as Reine Claude, German Prune and Copper grow so crooked that it is best to graft them into the tops of some straighter growing kind rather than to bud them.

Plant plums when two years old from the bud, in north and south rows, 12 feet apart, putting no two trees of the same variety next to each other in the row.

The only pruning necessary is to keep the top in shape, cut out dead branches and keep down black knot. Give good tillage, spray for black knot, also using the knife, and both jar and spray for curculio. For fruit rot, both thin and spray.

Fully half of this bulletin is devoted to a description of varieties of the European type of plums, richly illustrated by cuts of the fruits, stones, etc. Those recommended are Field, Lombard, Bradshaw, Coe's Golden Drop, Hudson River, Purple Egg, Italian Prune, Empire, Grand Duke, Arch Duke, Monarch, Reine Claude, Copper, French Damson and Farleigh. Of the Japanese, Red June, Abundance, Burbank and Chase are recommended, Red June promising to be the best of early plums for New York.—Western Fruit Grower.

WILD GOOSE PLUM.

Are there any richer or better plums than the Wild Goose, suited to this climate and reliable bearers? Would it do to cut off the top of a Wild Goose tree, let it sprout, and then bud in August with some other variety? If so, where could buds be obtained?

R. B. ROBINSON, Barton Co., Mo.

Reply by Prof. J. C. Whitten, Horticulturist of Missouri Agricultural Station: The Wild Goose is one of the best of our American plums. It is well, however, to plant others in order to have early and late plums. Among the Japanese sorts Abundance and Burbank are about the best for Missouri. Among the Europeans, Lombard is good. Other good plums are Miner, De Soto, Wayland, Shropshire, Damson and Golden Beauty. The above list will furnish a succession of different kinds of plums from July to October. The main branches of old

plum trees may be cut back, and the sprouts budded with any variety when the bark will separate from the wood. I have had better success in top-grafting just before growth begins in spring. Plum trees come into bearing so early that it is generally best to plant young trees of the varieties desired. Young trees, scions or buds, may be obtained from any of the nurserymen who advertise in the Rural World.

Prof. L. H. Bailey, of Cornell University, is convinced that the Japanese plums have come to stay. He does not mean by this that they are destined to supplant the *Domestica* and native varieties, but that they may be expected to supplement those types with varieties that are adapted to particular purposes and conditions. As a class he pronounces them vigorous, hardy and productive in tree, with handsome fruit, having a long season and long keeping quality.—Live Stock Journal.

COMMERCIAL PLUM ORCHARD.

In planting a commercial plum orchard location, varieties and management must be well considered. While the plum is not so sensitive to location as the peach, it will not bear the neglect which so frequently falls to the apple. A good elevation is desirable, but not absolutely essential to success, provided other conditions are favorable, such as a good soil and thorough drainage. There should be but few varieties in a commercial orchard, but those selected should combine size, quality and a fine appearance. As a rule, blue and purple plums sell best, as the yellow varieties are frequently placed on the market before they are ripe.

A good general list will include the following: Of the dark kinds, Bradshaw, Duane Purple, German Prune, Lombard, Englebert, Quack-enboss; of the yellow sorts, Coe's Golden Drop, General Hand, Jefferson, Yellow Egg. There are many other excellent varieties, but the above is a good general list. Of the Japanese plums Abundance, Burbank, Bailey, Satsuma and Willard have been highly recommended.

Thorough cultivation, early and frequent spraying and the jarring sheet for curculio are necessary to success. Before the leaves start go over the orchard and carefully cut out and burn all black knot. This is imperative. The trees should receive what pruning they require before the buds start, and the first spraying should be given just as the buds are opening. Corn and potatoes may be planted in young orchards, but when the trees come into bearing they should re-

ceive the full use of the land. Never sow wheat or oats among trees, as they are sure to rob the orchard of more than they return the owner.—George L. Perry, Michigan, in Orange Judd Farmer.

THE WILD PERSIMMON.

The wild persimmon is widely distributed over the western and southern states, but up to the present time has signally failed to attract and receive the attention it really deserves; but this neglect does not detract one iota from its healthfulness and usefulness. From present indications it is slowly gaining favor with horticulturists, and at some time in the near future will be a staple product of the orchard and of considerable importance in the markets. A few enterprising fruit-growers, Mr. Logan Martin among the number, have experimented by budding, and several years ago had 300 trees growing in his nursery.

In his report to the Department of Agriculture at Washington City, he says, the trees bear annually and the fruit finds a good market in Chicago and Indianapolis, at from \$1 to \$2 per twelve pint case, shipped by express. To say the least this is very encouraging, and should be a sufficient incentive for further experimentation. There are several varieties and much difference in their size and time of ripening. One variety is seedless. The tree is very tenacious of life, and lives to a good old age. Wind-storms and the extremes of heat and cold have but little influence upon them. From the above facts it appears there is a wide field for experimenting. Millions upon millions of the trees have been ruthlessly destroyed without a single thought of their usefulness and utility. On a farm owned by one of my neighbors there was a beautiful grove of them, consisting of at least 1,000 trees, where his children, his fowls, his cattle and hogs resorted in fruit time and feasted, fattened and fared sumptuously every day, and now there is not one left. "Axman, spare that tree."—C. Glover, Ham's Prairie, Mo., in *Journal of Agriculture*.

DWARF PEAR TREES.

It was the general prevalence of pear blight, and also a natural desire to have pear trees come earlier into bearing, that made dwarf pear trees 40 or more years ago so generally popular. The dwarfing of the pear is accomplished by grafting it on the quince, not our ordinary orange or apple quince, but a French quince that bears worthless fruit but has a dwarfer habit of growth than does the common quince.

Under the old-fashioned plan of neglecting the pruning of pear trees, those on their own roots, or standards, as they are generally called, were very slow to come into bearing. Thus the old saying, "he who plants pears plants for his heirs" came into use. It was found, however, that some kinds of pears, the Seckel, for example, came into bearing very early on their own roots. The kinds that do this mostly grow a great many short shoots, and as there is not plant food enough to extend all these shoots into branches, the shoots put out fruit buds and begin to bear.

By the judicious pinching back of the strongest shoots during the growing season this bushy habit of growth with consequent fruitfulness may be produced in almost any variety. Different kinds must be pruned differently, however. On very rich soil, if it is cultivated highly, an excessive pruning will be needed. The Seckel probably needs pruning less than any other, but on very rich soil it will also spire up, as it is the habit of most pear trees to do. In fact, when the standard pear tree is made to bear early, it is done by pinching back the shoots in summer and making it, so far as possible, a dwarf tree. This pinching back is one of the secrets of maintaining productivity in dwarf trees. After a few years, however, this summer pinching back weakens the quince roots and the pear tree outgrows them, and often breaks off where the pear and quince have been joined. To prevent this soil may be gradually drawn around the pear tree so as to encourage it to put out roots from the pear stock. Then it will grow the same as any other pear tree, but the bearing habit formed when the tree was a dwarf will be continued.

There are a few kinds of pears that succeed better as dwarfs than as standards. The Duchess, Beurre de Anjou, Flemish Beauty, Keiffer and Louise Boone are most commonly grown as dwarfs. Bartlett, Seckel and Clapp's Favorite will grow well either way, and come into bearing reasonably early as standards. As a dwarf, the Bartlett will begin to bear the third year after planting in this climate. In California, fruit is sometimes produced the second year, but its longer growing season, and possibly the pinching by drouth, accounts for this precocity in fruit bearing.

As a rule, early fruit bearing is at the expense of long life. We very rarely now see very old pear trees. The excessive pinching back to which they are subjected causes the trees to overbear. When a pear tree comes slowly into bearing, which is when it has not been pruned much, it will live to great age, and be fruitful so long as supplied with the needed mineral fertilizers.--Ex.

RIPENING OF PEARS.

It is not at all uncommon to hear one person praising up a pear which another condemns. The cause of this does not always come from a difference of opinion as to what constitutes a good pear, but from want of knowledge on the part of one or the other about how to properly ripen the fruit. A pair left to ripen on a tree is rarely of as good a flavor as it would have been if gathered a week or ten days earlier and put away in a close closet. Pears of a dryish nature, such as the Osband's Summer, for example, while passably good for their season if ripened indoors, are almost worthless when permitted to hang upon the tree too long. The same may be said of all kinds. Clapp's Favorite is very good when gathered early, and good for nothing when not so treated. In regard to the place to keep the fruits after gathering, it depends on what time they are desired for use. A temperature of about 45 degrees will prolong the ripening considerably, while a much warmer one, say of 65 degrees, will bring them along quickly. The early winter sorts cannot be kept too long. There comes a time when a pear should ripen, and the fruit seems better for not being too much retarded. There are always some individual fruits of the same kind which show signs of ripening, and these should be the ones selected from time to time for placing in a warmer room. It is frequently said in a complaining way that such splendid pears as Clapp's Favorite and Bartlett will not keep. These complaining people forget that no one wants to keep early pears. In Pennsylvania Clapps ripen in mid-August, and Bartletts a month later. These are expected to be used at once, as there are lots of other good kinds to follow. For that matter some of the fruit of these two, especially the Bartlett, can be gathered fully two or three weeks before it would ripen on the tree, prolonging the season over a period of four or five weeks in all. As an illustration, I gathered a number of Clapp's Favorites on August 6th. These were fit to eat on the 9th, and from that time to September 2 the fruit of the tree was in continual use. The Bartlett is a sort which ripens slower, and it can readily be had for use for five weeks. Lawrence is a favorite early winter pear with us, and when gathered just as frost approaches and kept in a low temperature as suggested, it can be had until New Years. Easter Beurre is still later than this. —Joseph Meehan, Pennsylvania, in *Prairie Farmer*.

QUINCES VS. PEACHES.

The fact that the quince is not a fruit that can be readily eaten raw as it is plucked from the tree doubtless prevents it from being as extensively grown as it should be. Yet as a fruit for the market it is much more reliable than peaches, and in a series of years will give more profit. The quince will grow on a much greater variety of soil than will the peach. If it can be kept moist enough, so as not to freeze deeply, sandy soil will grow quince successfully. Yet a rather damp soil, on which the peach tree will be an utter failure, the quince tree will thrive better than it will on dry soil. The reason for this is that the quince root is very tender and runs near the surface. The quince wood above ground is so soft and full of sap it can often be propagated from cuttings. The root of the quince is still softer, and of such spongy character that it absorbs moisture freely and cracks badly when frozen. The advantage of wet ground is that it does not freeze deeply, and the roots covered by soil are kept warm by the slight rising of sap which occurs even in very cold weather and do not freeze at all. In a sandy soil the frost penetrates below the roots, and there is nothing to keep them from freezing.

Quince trees ought always to be mulched in winter. To prevent girdling of the trees by mice the bodies of the trees for a foot above the surface should have some kind of poisonous wash that will prevent the mice from eating the bark, or will kill them at their first nibble. Arsenic may be used, mixed with a little grease. Still better will be painting the trees with a wash containing carbolic acid. The mulch need not be placed nearer than one or two feet from the tree, as the injury to the roots is much more likely to occur to the new growth at a distance from the tree, the new wood being much more tender than that several years older.

Owing to its late blossoming period the quince buds are very rarely killed by late spring frosts. It is usually as late as the first of June when quince trees are in bloom, and their pink and white blossoms make a sight only equalled by the golden yellow of the fruit in the fall. Yet between blooming and harvesting of the fruit, it has to encounter diseases that the old-time grower of quinces knew nothing of. Rot of the fruit and blighting of the twigs are troubles to which many neglected quince orchards have succumbed. But if the blighted twigs are promptly cut off and burned, and if the trees are sprayed with Bordeaux mixture two or three times during the growing season, as good

quinces can be grown as formerly. The quince fruit often needs thinning. Only when large and well ripened do quinces command high prices, and when thus grown we know of no large fruit that pays better.—American Cultivator.

GROWING QUINCES.

The cultivation of the quince is much neglected in Missouri and adjoining states. Neglected in two senses, in that but few of the trees being set, and in the few that are planted not receiving proper care. And yet the quince set in good, strong soil does not require much attention, not being very much subject to disease or the attacks of insects. Perhaps this is a reason why it gets so little attention, for very often it is not the most deserving who are the best cared for, but those whose demands and needs are most frequently urged upon us.

The quince is not likely to become popular as a fruit to be eaten raw, nor does it admit of being served in such an infinite variety of ways as the apple, yet it has a flavor and a fragrance peculiarly its own, especially relished by invalids as well as children, and in some of its various forms of preserved fruit, jelly or jam, it can impart a relish to wholesome bread and butter that will tempt the most capricious appetite away from the indigestible pie and cake that too often are eaten because they are so seasoned and flavored as to taste well without the "sauce of hunger" that imparts zest to the plainest food for the healthy laboring man. It was a wise man, as well as a poet, who bade us: "Let good digestion wait on appetite, and health on both."—Western Fruit Grower.

Pythagoras, "the Father of Philosophy," was a most strenuous advocate of vegetarian practices.

"He first the taste of flesh from tables drove,
And argued well, if arguments could move;
O mortals! from your fellows' blood abstain,
Nor taint your bodies with a food profane;
While corn and pulse by nature are bestow'd,
And planted orchards bend their willing load:
While labor'd gardens wholesome herbs produce.
And teeming vines afford their generous juice,
Nor tardier fruits of cruder kind or lost,
But tamed with fire, or mellow'd by the frost;
While kine to palls distended udders bring,
And bees their honey redolent of spring;
While earth not only can your needs supply.
But lavish of her store, provides for luxury:
A guiltless feast administers with ease.
And, without blood, is prodigal to please.

Wild beasts their maws with their slain brethren fill,
 And yet, not all, for some refuse to kill;
 Sheep, goats and oxen, and the nobler steed,
 On browz, and corn, the flowery meadows feed.
 Bears, tigers, wolves, the lion's angry brood,
 Whom heaven endued with principles of blood,
 He wisely sunder'd from the rest, to yell
 In forests, and in lonely caves to dwell,
 Where stronger beasts oppress the weak by night
 And all in prey, and purple feasts delight.

* * * * *
 "Not so the golden age, who fed on fruit,
 Nor durst with bloody meals their mouths pollute,
 Then birds in airy space might safely move,
 And timorous hares on heaths securely rove;
 Nor needed fish the gulfed hooks to fear,
 For all was peaceful, and peace sincere.
 Whoever was the wretch (and curs'd be he)
 That envied first our food's simplicity;
 Th' essay of bloody feasts on brutes began,
 And after forged the sword to murder man."

—Fruit Trade Journal.

IMPROVEMENT IN SMALL FRUITS NEEDED.

Each year turns out some new things of importance, but there is a tendency to work on a few lines. Just now the strawberry among small fruits is getting too large a share of attention. Unless there is a very marked freak—or cross with other fruit—there is little more room for improvement in this direction. We have a half dozen strawberries that are all we need for size, quality and prolific bearing. It may be possible to increase the strength of foliage and roots.

We are still looking for an ideal blackberry. The Kittatinny would pretty near fill the bill if it were hardy. Minnewaski and both Wilson and Erie are not able to stand hard winters. Agawam is too soft, but delicious. Snyder is too small. Ancient Briton not big enough. Wachusett much like Snyder. We need a berry as large as Kittatinny or the Lucretia dewberry, with canes growing erect like Snyder, instead of sprawling like Agawam and Wilson.

Have we yet reached the ideal currant? I do not believe we have. White Grape, when grown on rich, strong ground, is by odds the best currant in existence. I see but little difference between Versailles and Fay. But none of them is as large as we may reasonably hope for. The ideal currant should stand six to ten feet high and be nearly twice the size of our best. In quality, can we ask for better than White Grape? It is in this respect ahead of everything I have seen. Why not work for improved blackberries and currants?

Among the raspberries Cuthbert and Golden Queen and Shaffer, or probably Columbian, make our best trio—and Kansas is as good a

blackcap as we have in the catalogues. But Cuthbert and Shaffer always kill back more or less. Golden Queen is the hardiest. Shaffer is ideal for canning, so far as flavor is concerned. Golden Queen is too soft in the can. In all ways there is room yet for a great deal of work in the way of raspberry improvement. We must try to combine highest quality with entire hardiness and the prolific tendency of Cuthbert. Nor must we loose sight of bright color, and capacity to stand in rows. Turner would be superb only it cannot bear fruit unless kept in hills.

Some of our fruits have at present too short a season. While we can eat gooseberries and currants from July 1 to September 15, or later, our raspberry season covers only three weeks. The black varieties give us a much longer season. Grapes we can eat from August 10 till midwinter, and possibly the Alice will carry us on easily to April.—E. P. Powell, New York, in Orange Judd Farmer.

PROGRESS IN STRAWBERRY DEVELOPMENT.

The improvement of the strawberry has been slow, but as Prof. W. J. Green of the Ohio Experiment Station points out (Bulletin 85), there has been progress nevertheless. No perfect berry for all purposes has been produced but the intensification of desirable traits and characteristics is going on continually. The station has grown thousands of seedlings, but all have been discarded, although many were more valuable than the majority of those offered for sale. While good varieties are of great importance to fruit-growers, there is danger of making the variety question unduly prominent. It would be well to give more attention to intensive culture, as there are but few crops that offer greater inducements in this direction than the strawberry.

The use of water for irrigating strawberries is another means of intensive culture, especially during the season of fruiting. The conservation of moisture is best accomplished the first season by fall or early plowing, and thorough cultivation. It is quite as necessary to stir the soil after light as after heavy showers, even though no crust is formed.

The following are the most promising of the new varieties:

Aroma, Anna Kennedy, Beauty, Copernicus, Clyde, Carrie, Enormous, Glen Mary, Hall's Favorite, Portage, Ruby, Rio, Staples, Tennessee Prolific. Of well known kinds that can be recommended for general cultivation, Bubach, Brandywine, Greenville, Haverland, Lovett and Warfield are the best.—Orange Judd Farmer.

AN IMPORTANT POINT IN STRAWBERRY CULTURE.

It is all-important that a strawberry grower should plant varieties that ripen in succession, from the earliest to mid-season, or in many cases very late. It enables him to sell many more at a profit. If his market is a small and limited one, he is thus enabled to supply it through seven or eight weeks. If his market is large and unlimited, like the great northern ones, and his increase is limited solely by the size of his picking force, it enables him to pick more than twice as much.

As to varieties, 13 years of experience has convinced me that the following are best: For extremely early, Improved Westbrook and Murray's Extra Early, pollenized with Meek's Early every fourth row. These are not only prolific, but the earliest, the most splendidly colored and the firmest and best shippers I ever saw. They ripen so early that they can be picked and sold before medium early varieties begin to ripen. To follow close on the heels of these, I would have Brandywine, Tennessee Prolific, Woolverten, West Lawn and Bubach, pollenizing the Bubach and West Lawn with one of the three preceding varieties. These are all superb market varieties and heavy bearers. Aroma and Gandy give a large crop of the finest of late berries.

The season can be still further prolonged by having the Lucretia dewberry, which ripens just as strawberries are gone, and is an exceedingly heavy bearer, of large, luscious berries. It succeeds everywhere. If growers will follow the plan above outlined, they can plant a large acreage and still never have their berries spoil in fields for lack of pickers. Nor will the market be swamped by a glut of berries all ripened at one time.—O. W. Blacknall, Vance Co., N. C., in *Rural World*.

The *Rural New Yorker* says that observant strawberry growers have noticed that when nitrate of soda is applied to naturally soft-berried varieties of strawberries, such as Sharpless, the fruit loses color and becomes softer, while such varieties as Wilson and Lovett retain their color and firmness. When slower-acting fish or tauk fertilizers are used even the naturally soft berries are not injured.

TEN ACRES OF STRAWBERRIES.

HOW TO PLANT, CULTIVATE AND MANAGE SUCH A FIELD.

T. B. Wallace, who is known to many of our readers as secretary of the Republic Berry Growers' Association and an extensive grower of strawberries, contributed an article on the planting and management of 10 acres of strawberries to the "Strawberry Culturist," from which we quote as follows:

"In the first place the ground should be thoroughly prepared as early in the spring as the season will permit. Now select your plants, the very best you can get of the varieties you intend to plant—the Clyde, Wm. Belt, Glen Mary and Gandy would be my choice, with probably a few Bubach. Take them up carefully, throwing out any plant that has not a good lot of strong, healthy roots, and cleaning off old dead leaves and runners, wetting the roots and keeping them under cover, not allowing them to be exposed to sun or air.

"Now mark out your rows straight and as shallow as you can to make them easily followed. Now take a boy and bucket with a little water in it and have him keep his plants straightened out with the roots down in the water and have him drop them just as the planter plants them with a dipple, the planter being careful to get them planted the proper depth, not too deep nor too shallow, but about as they stood before taking them up and firming the soil about the roots thoroughly before leaving each plant. A man and boy can plant 4,000 plants per day and do the work thoroughly. Mark your rows at least four feet apart and plant from 18 inches to 2 feet in the row, according to the variety. Now that you are done planting keep the cultivator going over them every week or 10 days until the weeds stop coming, which is about the middle of August, using some small-toothed cultivator that will thoroughly pulverize the soil and not ridge it up, and keep all the weeds that the cultivator fails to get cut with hoe or pulled out and turn your runners with the row until you get the desired amount of plants for a crop, and after treat all others as weeds.

"In laying out 10 acres I would mark the rows north and south and run a drive exactly through the middle east and west, and at the middle of this driveway and on the south side I would build my packing shed, leaving the opening on the north and next to the driveway. Now that you are ready for harvesting your berries, you should have a sufficient amount of new clean crates and boxes to hold your crop

in readiness and convenient to packing shed. For 10 acres it will take about 150 pickers; put a sufficient number of field bosses out to superintend the pickers to see that the pickers pick clean the rows assigned them and not bruise the fruit or put in any small or green fruit, stems or leaves. Keep one person stationed near the shed with a good conductor's punch to punch the tickets as the pickers come in or hand checks out, whichever is used. In providing carriers for the pickers always keep 10 or 12 extra at the shed and have a boy to keep them filled with empties from the crates as your packers take the fruit out of them and set them just outside as filled, so the pickers will only have to set down the full carrier and pick up an empty and return to the field. Some have boys to carry empties to the pickers and bring in the fruit, but I have found from experience that by laying out plantation and drive as above that they do not have so far to go to empty, but that they will, I believe, pick more berries in a day and carry their own fruit, as it seems to rest them to walk to the shed and change their position for a few moments.

"As to prepared fertilizers I have never used any, as here in the west the land is naturally rich, but we use all the stable manure and ashes we make spreading it on in the fall and winter after the ground freezes, leaving it to leach through the winter and early spring."—Southwest.

THE MILLER EARLY RED RASPBERRY.

Question: Judge Miller, did you raise the Early Red Raspberry, and what can you tell us about it? No, I did not raise it; never had it until last spring. I cut the plants back to the ground, and yet they sent up some bearing canes, that bore as fine fruit as I have seen. My faith is great in it. An eastern man [who grows it extensively says: "Should the Vanderbilts, the Goulds and the Astors distribute their entire wealth among the people of the United States and Canada, the public would not be benefited as much as it will by the introduction of this berry."

From the substantial testimonials given, it must be just what we have been needing these many years. My plants have made a strong growth, and if spared until the crop ripens we will know more about it for this region. Its origin I do not know, but learn that the parties raising it refused to sell plants for a number of years; in an endeavor to multiply it for their own planting, the fruit sold so well. In the north the London is the favorite, but those who seem to know say that the Miller is its equal, and the plants can be bought for half the price.—Rural World.

MR. COLLINGWOOD'S STRAWBERRY METHODS.

With me the only berries that are worth growing are the large, dark-colored, high-flavored fruit that can be sold "twelve hours from the vines." It is only with such fruit that I compete with the larger growers. I use chiefly the varieties that grow best on single hills, like Parker Earle, Marshall, Glen Mary and Gardiner. I use the hill system for various reasons, chief of which are the facts that we want sunshine on all sides of the plant, and that we usually grow other crops while the strawberry plants are gaining their size. Our plan of growing is about as follows: Last spring we selected a strong piece of land. I would prefer a level, well-drained field that had been in cowpeas the previous year. This was first worked several times with the cutaway and thoroughly chopped up. It was then deeply plowed with a swivel plow so that the cutaway soil was turned to the bottom. On most of my soil I would omit this plowing, as the soil is so shallow that part of the sub-soil would be plowed to the surface. After plowing, the ground was well worked, first with the Acme and then with the Iron Age two-horse cultivator. The object of this was to have the soil well pulverized and aired down to the sub-soil. Large and strong plants were dug with a transplanter, and set three feet apart in rows six feet wide. Those plants never stopped growing for a moment. Just after the strawberries were set out I planted June eating potatoes midway between the rows of strawberries. The potatoes were dug in July, and the rows were leveled and worked with the two-horse cultivator. With the transplanter I then set out to run out plants on the potato rows, fifteen inches apart, and also in between the old plants. This bed will probably be picked three years, and will then be plowed up and either planted to late cabbage or sowed to cowpeas. Next year I shall change this plan and set the plants four feet apart each way, with hills of early potatoes between the plants. The potatoes will be started on sods in the hotbed and transplanted after frost. I have also transplanted strawberries after clearing the land of peas and Crosby sweet corn. My Glen Mary potted plants were set out this year in October. I have transplanted Parker Earle strawberries as late as the second week in November and picked a fair crop from them the following spring.—Orange Judd Farmer.

EXTENDING STRAWBERRY FRUITING SEASON.

Where berries out of season bring a very high price, cold storage has been employed quite successfully. However, this is beyond the reach of most of us, hence the great mass of family gardeners must be content with simpler methods. A number of early and late varieties of strawberries have been produced which will enable anyone to prolong the season several days by simply selecting varieties with reference to their time of fruiting. Early varieties may be hastened in the spring by planting on a warm, sandy soil, with a southern exposure. If the mulch is removed as soon as the ground is in condition to work, and the early varieties thus exposed thoroughly cultivated until the berries begin to ripen, their fruiting season will be hastened.

However, the opposite process may be more successfully employed with one of the latest varieties. The late ones should be given a northern exposure and left unmulched in the winter until the ground is deeply frozen, and then mulched lightly with straw or coarse manure. After this mulch has settled and is covered with snow or ice, spread on a thick layer of straw, the thicker this second covering is the better. Both of the layers should be left on the late strawberries until the earlier ones are in blossom, when it should be removed and the plants helped through the first mulch in case they do not readily come through alone. Plants left covered until late in spring have less ability to help themselves through any mulch than those that have been allowed to start early.

Gandy's Prize, deeply mulched in a manure as described above, may be made to fruit through the last of July, and with considerable watching I have found no trouble in extending its season into the month of August. If left covered too long after warm weather, they should be carefully watched and uncovered as soon as they show signs of smothering. When uncovered, plants that have been heavily mulched will be thoroughly blanched, and in this condition they may be left covered as long as the young leaves remain plump and fresh. For a long time Gandy's Prize has seemed well adapted to this kind of treatment. In this section it is a shy bearer, but its extra late fruiting season and large, firm berries have kept it in the field. The Western has been highly recommended of late as having the good qualities of Gandy's Prize and at the same time being more prolific. The Michigan is another late variety which has been much improved, and is claimed

to be from ten days to two weeks later than Gandy's Prize. The berries are said to be firm, large and the vines very prolific.—Charles B. Cook, Michigan, in *Prairie Farmer*.

WHEN TO PLOW UP STRAWBERRIES.

I have noticed the advise of several strawberry specialists that "it did not pay to retain strawberry plants more than two years; that a grower can turn under his beds every spring and reset the ground cheaper than he can clear the ground of weeds and grass."

This is no doubt true if the ground was not thoroughly freed from such foul stuff before planting, but I think one is very unwise to ever think of setting plants on such ground till every vestige of it has been exterminated.

My first experience of setting plants on sod ground was most emphatically impressed upon my mind. I had more hoeing and hand-pulling to do on that plot of plants than on any plot of four times the area since then. I grow at least one cultivated crop previous to setting plants, and if the ground is not then free from grass and weeds I grow another, but I do not forget to fertilize, as two crops in succession will exhaust much of the available fertility.

One field which I set to plants recently grew two crops of sweet corn. Each August I sowed rye in the standing corn and during the winter I drew out manure and gave it a good coat; there was but little leaching of soil or manure, and when plowed under I had a deal of green matter to supply humus to the soil. This humus is very necessary to plant life; it is a means of supplying nitrogen to the plant. Soil will retain moisture better, besides regulating its texture.

The first season after setting plants the ground is kept perfectly clean, and when winter sets in we give the plants a covering of straw if in an exposed position. When our plants are through fruiting we burn them over. This will destroy many weed seeds and any grass which may be growing. We start the cultivator immediately and keep it going often enough during the fall to kill any weeds which start and prevent a crust forming on the soil. By this course we have kept a bed in profitable fruiting for three and four years. One of my neighbors gathered fruit from beds which were set five years ago, and is now preparing them for the sixth crop. This season he said they yielded nearly 100 bushels per acre, which is as good as the average crop.

I have kept book account of my berry crop for several years, and from my own experience I find it much cheaper to grow beds at least

three years. I find that the first crop will cost two to three times as much as the two succeeding ones. The fruit from my beds in '96 cost me just five cents per quart, and this year the cost would not have exceeded two cents if I had not had to sort. As it was, they cost two and one-fourth cents.

One advantage of the old beds is that the fruit will be a few days earlier, and anything which will hasten maturity without increasing the cost is quite an advantage to the progressive fruit-grower.—B. A. Wood, Kalamazoo county, Michigan, in *Epitomist*.

CULTURE OF RASPBERRIES.

Raspberries prefer a deep loam that is rather moist than dry, thereby keeping the roots cool. All the manure that can be worked into the soil to advantage before planting should be used. It should not be coarse, as such will not mingle with the soil properly. After the ground has been thoroughly prepared by plowing and replowing, harrow it smooth, mark it off in rows five feet apart each way, thus enabling horse-cultivation to be done both ways. A block planted in this way is easier and more economically worked than the row or hedge system. Perhaps more berries can be produced by the latter, but the fruit will not be so fine, and the fine fruit always brings the best prices.

Purchase plants, grown from root-cuttings, from a reliable nurseryman. Trench them in the ground as soon as received, and take out only as fast as needed while planting. Put two or three (according to size) in each hill, and see that the soil is well worked among the roots. After the hole is filled, tread the ground gently with the foot. Prepare the ground and plant well, as this operation is to last for years.

All that is necessary the first year is to keep the ground loose and the weeds down by continued deep cultivation, which is easily done by going through the rows both ways once a week or oftener, if necessary, with the cultivator. This will help to keep the ground moist, too—a point very important in a dry season. Pull out all weeds from the hills that the cultivator does not reach. "Clean, thorough cultivation," is the motto of the successful gardener, and the best results are not attained without it.

In the fall select five or six of the best canes in each hill for next season's fruit, pulling out all others. Take these canes, one hill in each hand, bend them down permanently. Five feet apart may seem too great a distance for such treatment, but where they have had proper culture no difficulty will be experienced in this point. After the first

season, this laying down and covering will not be necessary. Still I think red raspberries are, like grapes, better covered in the winter in northern climates.

In the spring, as soon as danger of severe frosts is over, lift the canes out of the covering and cut off a third of their growth. As soon as the ground is in condition, start the horse and plow deep, but not so close as to disturb the roots. Keep the cultivator going until picking begins, when all horse work should be stopped, as fruit will be jarred off and wasted.

After the crop is disposed of, trim out all the old canes, clean up the ground of all rubbish and burn immediately; after which go through the same process as directed for the previous fall; only do not stir the ground too late, as it is likely to cause a late growth that will not ripen before frost comes. Too much emphasis cannot be put on the points of deep, clean and frequent cultivation.—Colman's Rural World.

THE FALL PLANTING OF RASPBERRIES.

While in a general way, for our northern climate, I am very little in favor of planting most kinds of nursery stock in autumn, I have had excellent results from the planting of raspberries at this season. Hence I have no hesitation, says a writer in *Ohio Farmer*, to recommend to those who have not already prepared for a supply of these for the home garden that they shall arrange to plant of both the red and black sorts the coming fall; and plant generously of each kind, not purchasing the plants by the single dozen of some irresponsible nursery agent, representing that he has some new sort superior to any other that has ever yet been introduced, and for which he will charge you for a dozen plants almost, and often quite as much as you could purchase 100 of some reliable grower. Send and get the price-lists of some reliable nurserymen and learn from them the actual value of the plants desired, then select from the old and tried standard varieties such as are known to succeed, send in your order for from 50 to 500 plants, according to the space you desire to devote to them, and when received plant carefully, and my word for it, if given proper care in after culture, unless some untoward conditions should cause a failure, you will be satisfied when the fruiting season has arrived that your investment has been a most profitable one. I would recommend not too early planting, the object being not so much to secure any growth this fall as to have the plants in the ground and ready for growth when spring opens.

From the middle to the end of October is, I think, all things considered, the best time for this work if to be done at all in autumn.

For at this time the new plants are much better matured than at an earlier date and the growth they have made before removal will be worth much more to them than they could be expected to make thereafter. Some good authorities have claimed that the later they can be placed in the earth before it freezes up in the fall the better, and my experience on at least one occasion would seem to very strongly corroborate that theory. Engaging to plant for a friend about 500 raspberries from my own grounds, in the autumn, I was belated by some means beyond what I expected, and as it turned out, just reached his place in time to get them set the day before winter closed in and the ground froze up. We took especial care in planting, it being so late, though we hardly expected winter to come on so soon, and around each plant as set we drew up a little mound of earth, which we instructed should be removed in spring to the level of the surface, and although the winter following proved to be a severe one, never have I seen a newly-set plantation of raspberries, either of fall or spring planting, do better. This matter of raising a little mound of earth around the crown of any plant or tree set in autumn I consider of much importance, often serving the twofold purpose of protecting it from water which might settle in and freeze about the plant, and also as a protection against damage by mice.—Prairie Farmer.

RASPBERRIES AND BLACKBERRIES.

One of the most difficult things in our horticultural work is to properly care for plantations of raspberries and blackberries after they have become established. To keep them in narrow rows and to keep the spaces between rows free from weeds and suckers is a difficult matter, especially if we use deep-cutting implements. The persistent suckering of the red raspberry and blackberry in the spaces, aggravated by the use of cultivators which breaks the roots and causes them to spring up by the thousands, must be overcome, if our plantations would be made productive and lasting. To accomplish this I have pursued the following modes of planting and of culture: The first requisite in proper planting is to have your ground thoroughly plowed, harrowed, and made level and free from all rubbish, stones or other impediments to a thorough cultivation afterwards. This should be done this fall for next spring's planting because, as a rule, of late years our springs are so short that there is too much to be done for the time we have. In spring just as soon as is possible the land is furrowed in rows six feet apart and furrows made deep as possible. In the bottom of these furrows we put our plants, covering them sufficiently to start them

growing, and filling up the furrow by subsequent cultivation till our land is as level as before furrowing. The only thing is to be careful when planting blackcaps that you do not plant them too deeply in the bottom of the furrow lest in case of much wet weather the plants would be smothered, but when they once start then you are safe. This deep planting is done for two purposes: First, to guard plants from drouth the first season, and second, to force deep rooting of plants so that they will be below the cultivator, thus protecting the roots from breakage. With these two precautions I am insured a fine season's growth and a fair amount of fine fruit the first season. The first season's culture can be safely done with any implement that will loosen the soil so that it does not run too deep. Even a double shovel will do good work by using small shovels. With the second season our trouble begins, for now an innumerable army of suckers will spring up, and unless subdued will suck the life from our bearing plants. For this purpose I have made a cultivator, and its use proves its superiority over the general run of implements. This cultivator is run every two weeks in the spaces until every sucker and weed is eradicated and the top soil is as loose as dust. It should not be set to cut deeper than three inches. By its use my rows are uniform in width, all spaces are free from weeds and suckers, the soil is made drouth proof, and all the strength of the roots goes to the fruiting plant and not to nourish suckers. The cultivator can be made for one horse or for two, of course running the one-horse twice in the space. For a two-horse cultivator I use 4x4 hickory or oak. The \wedge arms are six feet long and the cross arm four feet. The center cross arm insures firmness. For the knives or cutters use bar steel one inch wide and three-eighths inch thick. Cut this into lengths of one foot. Have them bent in L form, the lower, or knife part, being three inches. This is drawn out to a sharp cutting edge and kept sharp all the time. Insert them in the beams in mortices, the knife cutting inside and slightly inclined to the rear. The upright arm of the knife should be sharpened for at least three inches. For cross arms use triangular harrow teeth, inclined to the rear so as to prevent clogging. For a one-horse cultivator the \wedge arms need to be four feet and the cross beams two and one-half feet. It will require about eighteen knives and nine teeth for a two-horse cultivator, and for a one-horse twelve knives and six teeth. If you once try this implement you will agree with the writer that it is par excellence, the one for success in growing fine berries. It can be used in cultivation of currants and gooseberries where planted the proper distances, and with the same success as with the berries.—J. H. Haynes in *Prairie Farmer*.

FALL BEARING RASPBERRIES.

To many persons the fruit of the raspberry in the fall is a luxury, coming as it does when no other fruit of this nature is to be had. There are but two sorts that have proved of any value, of about a half dozen kinds tried—the Catawissa and the Belle de Fontenay.

At one time the latter sort was much grown by amateurs in these parts, but I have not found many persons growing it of late. Frequently at the horticultural shows held in September very fine dishes of this berry were to be seen. When shown alongside of the Catawissa, they were, as a rule, far superior to it. Nevertheless, perhaps because its merits are not so well known to the gardeners of today, it is not rarely met with, the Catawissa being grown almost solely. Another variety, called Marvel of the Four Seasons, a French kind, was tried, but did not prove of any value.

To have these fall bearing sorts produce well they must be cut down in the spring, so that vigorous young canes will grow, as from these the crop of fruit is to come. The stronger the canes the better the crop of fruit, hence the importance of applying plenty of manure to the ground, and keeping up a cultivation of the soil while the plants are growing.

It is not impossible to have fruit on ordinary raspberries when treated as these are, though there is something in the nature of the two kinds mentioned which seems to fit them especially for fall bearing.—Joseph Meehan, in *Gardening*.

ADVISE TO SHIPPING ASSOCIATIONS.

Fully appreciating your efforts in the interest of co-operation and the great interest you have in its success, I feel you will be glad to give space in your valuable paper for an article along this line. We are pleased to say that the co-operative union recently organized at Monett for the distribution of fruit is increasing in membership rapidly. Already 20 associations have enrolled, or have decided to enroll as soon as they hold their meetings to vote upon it. Everything is looking encouraging for success.

Each local association should, as near as they can, select one commission house in each of the leading markets that will be used by the

union in placing shipments. Then when their car is routed, to whatever city it may be drawn for, they will have a selling agent there to consign to. As the success of distribution will depend to some considerable extent upon the way our berries are handled at the other end of the line it will pay each association to take the pains to inform themselves as to the commission house they engage with and their manner of doing business.

In the first place it is, in our opinion, a bad business policy for any local association to set up a competition in the sale of their own products by having two selling agents in the same market, for competition never raises prices. Now, to illustrate: The Monett association might have one house as their agent in Denver and Springfield another. This would not bring Monett's berries in competition with Monett berries, but if Monett has two houses in Denver she brings her goods in competition with herself.

Again, it has been our observation that there is a great deal of difference, as far as the interest of the grower is concerned, in the way of business of the sale of our berries is conducted. The commission man who tries to hold up the price always conserves the interest of the grower better than the one who educates his trade to continually expect prices to go lower, and persists in operating on the low price theory with the parties with whom they expect to place our goods in order to pass as much through their hands as possible, figuring that it will pay them better to sell two cars of 600 cases each at \$1.50 per case, than it would one car at \$2 per case, which it would, to the amount of \$60 in commissions. But the grower would lose \$600 in the deal.

Another point before we leave this part of the subject: The practice is indulged in quite a good deal, by selling agents of reshipping our goods to other cities, where we also have regular distributing agents. This will have a tendency, more than any other, to destroy the benefits intended to be derived from distribution. This brings our fruit in competition with itself again and the first thing you know some one will be cutting prices. Most certainly will this be the case if the prices in the market to which our goods are reshipped are averaging better than the prices in the city or market from which they are shipped, especially so, if the two markets should be located near each other, out of the desire to prevent better return sales from a competitive market than the party who reships our products is able to make themselves.

In view of the fact that through the Union we shall be able to so distribute our crop among the large distributing cities as to make it unnecessary to reship from one distributing point to another by ex-

press, and the fact also that every time they are reshipped they are injured more or less in appearance, and consequently, bring less money, it will be well to give this matter due consideration in the selection of our selling agents. While the selling agents in all the large distributing cities will have to reship by express to all their out-of-town trade, in the smaller towns and cities where no car-load shipments will be sent, it will no doubt be best for us to expect that our general distributing agents in the large cities do not interfere with each other by express shipments through claimed branch agencies or otherwise.

In regard to our representatives that we will send to the markets this season, perhaps it would be well for each association to select their men soon, so they could be assigned to their different points, make their arrangements to be ready to go, and it would no doubt be well for all of them to meet with the Executive Committee some time between now and the shipping season.

Mr. Editor, for fear that my communication is already too long, I will close by saying to all strawberry-growers, and especially to members of the Co-operative Union, to give all outside parties who are not growers, who are openly or otherwise fighting the co-operation of producers, a wide berth, the relative position of the two being a sufficient reason for so doing.—Geo. T. Tippin, Nichols, Mo., in Southwest.

ORGANIZATION IN MARKETING PRODUCTS.

Should producers organize to market their products? Most of the receivers of perishable products will answer this query in the affirmative, because a great many valid reasons may be advanced to show the benefits arising from organization. The pioneers in successful organization were the fruit-growers of California. In the early stages of their efforts to grow fruits and vegetables for distant markets, they were beset by obstacles difficult to surmount. The item of distance to paying markets and the question of transportation and rates called for the ablest men in the industry. Powerful corporations had to be handled in the interest of the producer; living rates, faster time and improved methods were demanded, and the railroads saw the wisdom of yielding, as the concessions tended to double their business every year—and the enormous traffic which followed is no longer news to anybody.

The further from market the greater the need of getting together, as the risk increases with the distance. In this connection, the routing and distribution of the goods becomes very important, and cannot

be successfully handled without organization. Wherever there is any considerable number of growers or shippers, steps should be taken towards organization. Elect officers to direct affairs for the coming season. Good, responsible, experienced firms should be selected to handle your products in every city you desire to reach.

Such firms are bound to take better care of your interests than of individuals, because there is more at stake, and the merchant realizes that if he makes a mistake or at any time misleads you in his advices, he is likely to be dropped for somebody else. One telegram or letter serves all—and the labor saved at both ends, by dealing with one man instead of 12 or 50, becomes apparent. The commission man charges the Association seven instead of ten per cent, and it really pays him better, because of work and time saved.

In dealing with transportation companies and other corporations, your claims would receive attention where the individual would fail; recalling the old adage, that in "Union there is strength." In buying your packages, fertilizers, or anything else needed by the community, you can secure better terms than any individual. All sorts of concessions are made to such bodies, the profits being greater and the risk less—all of which is natural and customary in every channel of trade. Incidentally, the isolated shippers at the smaller shipping points are protected to a beneficial extent, as the unions and larger bodies elsewhere, who are posted daily by wire, in a great measure save all the markets.

Much more might be written showing the necessity of unions and organized bodies, without which the industry cannot produce all it is capable of at any shipping point. It might be urged by some that these unions have a tendency to flock to leading firms in each city. This, however, need not necessarily follow, as unions, like individuals, go to different firms, and they will continue to do so, as they increase and see the necessity for it.—P. M. Kiely before National League of Commission Merchants, at Buffalo, N. Y., Jan. 12, 1893.

BUSINESS SIDE OF FRUIT CULTURE

In Horticulture Hall, Boston, J. H. Hale of South Glastonbury, Ct., spoke on the "Business Side of Fruit Culture."

I am surprised, said Mr. Hale, that New England does not wake up to the chance of the control of the fine preserved fruit trade, which is invaded by as distant a competitor as Germany. Another opportunity for New England is the cultivation of chestnuts as a commercial crop.

On a slight investment, by grafting on sprouts, a large profit can be made.

Fruit culture alone enables one to sell the public "watered stock" without objection, for the more you adulterate the solids of fruit with water, the better market it finds. There is also economy in this, for the soil is less exhausted in growing fruit thus treated than in raising other products. Long experience has taught that the longer we keep a healthy foliage in the fall, the better fruit buds will appear in spring. It is a mistake to leave land bare, as it thereby loses nitrogenous matter, the principal fruit food. A good plan is to have a cover crop of one kind of clover or another; sow in October and plow down in early spring. Phosphoric acid and potash are the chief fertilizers needed, but in different proportions, according to the soil.

It is most necessary to watch for the "San Jose scale," a disease of the bark, and the "yellows," so dangerous to peach trees. The business side of fruit culture also demands the thinning of all fruit trees; such treatment of apple trees will insure a crop every year, and in the case with blackberries and similar fruits result in a fairer, and so more salable, product.

GROWING AND MARKETING FRUIT.

The greatest obstacle to successful growing of fruit culture lies in the imperfect preparation of the soil. Most of our soils are deficient in humus or vegetable matter. They are also compact and hard, consequently deficient in moisture. Therefore these two elements must be secured before we can hope to succeed, particularly with small fruits whose roots cannot extend deep down to draw up moisture from below. I have found that in no way can I secure this needed moisture so certainly as by incorporating humus into the soil, making it porous and permeable to the air, which carries moisture that becomes condensed and stored up for plant growth.

This humus can be most cheaply and easily procured by growing such crops as clover, oats and peas, rye and buckwheat, as time and circumstances allow, and plowing them under in a green state. Be careful to compress the soil by rolling after plowing. This green matter quickly decomposes, its moisture feeds the plants and dissolves the mineral elements in the soil for plant growth.

I have found it very necessary to deepen the soil in order to hold sufficient moisture, and my land has all been plowed nearly 12 inches deep. This has resulted in growing large crops on land where for-

merly they were ruined by protracted drouth. Having properly prepared our soils by deep cultivation and proper fertilization, let us select such varieties as our location and the demands of the market require. I have found that only by trial on my own soil could I determine their value to me. I have been an earnest advocate of quality in fruits, but I must say to the man who is growing fruits for market: Grow what the market demands, which is large, showy fruit. Quality has given place to good looks. I cite you the Keiffer pear and the Ben Davis apple, which have been sold the past fall for more money than many choice varieties. Therefore the commercial grower must be governed in his choice of varieties by the demands of the market and the adaptation of the fruit to his own soil.

The sale of fruit in our markets is dependent upon certain conditions which may be classed under four heads: First, the character of the fruit offered; second, the kind of package used; third, proper grading and packing; and, fourth, the condition in which it is received. The first of these conditions must be supplied by and is dependent upon the producer. If he has first-class fruit to put on the market, the main point is secured, provided that the other conditions are complied with. One of the most disturbing elements in the marketing of fruit, particularly small fruits, is the fraud practiced in using small packages of every description.

Believing that we cannot expect any material increase in the selling price of our fruits so long as we persist in our present methods, I can but recommend for your consideration these several points which I have presented.

1. Improved methods in culture, resulting in improved quality.
2. Standard packages, established by law, suitable for each class of fruit.
3. Proper grading of fruit, all below a given grade liable to seizure and confiscation.
4. Organized effort through state and local organization to secure reasonable and proper charges by transportation companies and canners.—Walter F. Taber, in *Orange Judd Farmer*.

WASTEFUL MARKETING.

Losses suffered by the present methods of selling farm produce are not always well understood by the farmer. The fact is, there are other things besides the middlemen to cause shrinkage in his returns. There is much actual waste chargeable to the present system, or rather

lack of system, by which his goods go to market. In a recent bulletin issued by Secretary Wilson on this subject the following strong language is used: "To anyone who will take the trouble to make even a cursory examination of the markets of any of our large cities, it will be evident that there is ample room for improvement in the manner of marketing farm produce. A very little additional inquiry into the subject will reveal a condition of things which, involving as it does a waste of material and labor on the part of the producer aggregating an enormous loss, may be described without exaggeration as disastrous." The writer of the above declines to discuss the present organization of the trade, but taking things as they are he proceeds to emphasize his statement by a recital of some cold facts.

Individual farmers often make mistakes both in shipping on their own account and in selling to local buyers, and by using barrels and packages larger or smaller than the accepted standard or of a different form find their generous measure shrink to regulation size on the "returns" and their undersized or unusual package heavily discounted. All through the season instances may be found daily in all our great markets which indicate unmistakably a lack on the part of packer and shipper of acquaintance with the conditions which attend transportation of produce and with the demands of the market.

It is the utter lack of intelligent system at the shipping point that brings these unprofitable results. The local buyer, as a rule, makes no effort to provide a better system or educate the farmer. The smart, self-sufficient farmer or shipper need not felicitate himself that he is not harmed by this state of things—that only the careless and ignorant are losers. This is a narrow view of the matter. The results of such imperfect trade conditions reach far beyond the unfortunate shipments first affected. The local buyer loses on some of his purchases, and therefore must have a wider margin on all. A confused condition of consignments makes extra work to sort, rearrange, repack and sell damaged goods, and commissions must be high enough to pay the extra help. These losses and others of similar nature fall on all shippers alike. But more than all this is the fact that goods sold at depreciated rates tend to depress the market for all grades. Purchasers, after repeated disappointments in the effort to find a satisfactory article, turn to other lines of goods or to those of foreign origin.

When we see a farmer work early and late and eat the bread of sorrow that he may buy expensive machinery only to subject it to such treatment as will quietly destroy it; when he winters his reaper in the field and gathers his grain into a roofless barn; when we see the kitchen and dairy utensils scattered about and put to improper uses,

the horse drinking from the milkpail and the boys coasting in the best copper boiler, we rightly infer that there is a lack of system in the management of that household which entails in all of its departments slavish labor and ruinous waste. We see a similar lack of system in the present organization of the farmers' trade. Can it fail to bring similar results, and is it a more attractive exhibition in the one case than in the other? If the farmer will organize and himself assume control of his trade, a reform will speedily follow and herein lies his remedy.—L. M. St. John, Montgomery county, N. Y., in Orange Judd Farmer.

SUBSOILING.

Every crop season brings with it conditions peculiar to itself and gives prominence to methods of soil management which the previous season, perhaps, by reason of its character, threw into the background. The dry years of '93 and '94 emphasized the importance of storing moisture in the soil and conserving it by appropriate tillage during the season of growth, and during those years a good deal of thought was given to subsoiling to increase the storage capacity of the soil, and to continue surface cultivation to prevent evaporation. In 1895, with a moderate rainfall, good crops were the rule, and much of the success of the year was probably due to the fact that the lessons of the previous two years in regard to the importance of conserving moisture, were fresh in the minds of every farmer. Then came the wet season of 1896, which made the west forget that it had ever been in any danger of suffering from drouth. The present season, which was wet in the earlier months and turned dry at a critical period in the growth of the corn crop, would, we verily believe, result in a great deal of loss to the corn crop if 1896 had been a dry year, but the season, coming as it did after a wet year, care that might have been taken to conserve the moisture which fell in the first half of the season was not taken, and the adverse effect of the dry period thus became very considerably intensified.

The lesson that one should endeavor to master in relation to soil management are not to be extracted from a single year, but rather from a series of years. For several seasons prior to 1893 tile drainage was a very popular thing, and a great deal of it was done. Moreover, many desired to drain who felt unable to do so. When the dry years came the men who had believed strongly in tile drainage never spoke of it, even in a whisper. After the wet season of '96 there was a similar silence in regard to subsoiling. The land had been wet enough re-

cently, so why make reservoirs to hold more moisture ? But there are thousands of fields in the west that succumbed to drouth this year which probably would not have done so had they been subsoiled in the fall of 1896. Many are beginning to realize this, too, although, as is too commonly the case, the realization comes too late to do any good except to those who can permanently store up their experience for future guidance.

Among this class of farmers it is probable that some subsoiling will be done this year. The time to do it will be shortly at hand. Nearly or quite all the experiments that have been made in subsoiling in the West have shown that the work should be done in the fall. The opportunity for accumulating moisture is better and, with our present knowledge of the subject, it seems pretty certain that the land needs time to settle after the work is done and before the crop is planted. This makes it necessary to do in the fall such subsoiling as may be done. It should be remembered, too, that not all soils are benefited by subsoiling. Lands that are sandy or gravelly underneath and have a tendency to leach, are probably injured rather than benefited by subsoiling. On the other hand, lands in which the subsoil is most compact, and from which water finds a difficulty in escaping except by surface drainage, are most benefited by this treatment. Everyone who thinks of subsoiling should study the character of his own land and try and determine whether it will in his case be beneficial. In case of doubt a little subsoiling may be done in an experimental way upon a small area.

No more individually instructive experiment could be made by the farmer than to subsoil a strip in a field this fall and then watch the result next season to see how the yield compares with that of the remainder of the field on which no subsoiling has been done. We are not prepared, and we do not think anybody in the West is prepared, to say with any degree of positiveness under just what circumstances subsoiling is profitable and when it is not. That is a question that can only be determined after the collection of a good deal more experience than has yet been recorded. We think, however, that the treatment is one that will be profitable on many soils, and we would be glad to have any of our readers who have tried it, or think of trying this fall, give their experience with it as soon as they attain results from which deductions can be made.—Live Stock Indicator.

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